SF
H85
M67
Draft

Muni Metro Turnaround Project

DRAFT ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

SAN FRANCISCO MUNICIPAL RAILWAY
SAN FRANCISCO PUBLIC UTILITIES COMMISSION

DOCUMENTS DEPT.
AUG 26 1988
SAN FRANCISCO
PUBLIC LIBRARY

August, 1988

HDP-9060

5/S

GOVERNMENT INFORMATION CENTER
SAN FRANCISCO PUBLIC LIBRARY

SAN FRANCISCO
PUBLIC LIBRARY

REFERENCE
BOOK

Not to be taken from the Library

DOCUMENTS DEPARTMENT

SAN FRANCISCO PUBLIC LIBRARY
3 1223 04289 7174

U.S. Department of Transportation
Urban Mass Transportation Administration

Western Area Office

211 Main Street
Room 1160
San Francisco, California 94105

August 12, 1988

Dear Sir:

The Urban Mass Transportation Administration (UMTA) in cooperation with the San Francisco Public Utilities Commission (SFPUC) has prepared the enclosed Draft Environmental Impact Statement (DEIS) for the Municipal Railway (MUNI) Metro Turnaround project. The document analyzes the impacts of alternatives for improving the turnback of trains in the Muni Metro system at the eastern terminus of the Market Street subway. The project study area is located in the City of San Francisco along the Embarcadero; the two build alternatives considered would locate train storage and switching operations in the median of the Embarcadero Roadway, with portals at points either north or south of Howard Street.

The DEIS is being circulated to interested agencies and the public for a 45-day comment period. Written comments on the DEIS should be sent no later than October 10, 1988, to Ms. Carmen C. Clark, UMTA Region IX, 211 Main Street, Suite 1160, San Francisco, California 94105, or Mr. Merrill R. Cohn, Project Manager, Public Utilities Commission, Utilities Engineering Bureau, 1155 Market Street, San Francisco, California 94103. A public hearing on the project will be held on October 4, 1988, at 2 p. m. in the San Francisco Port Commission Hearing Room No. 3100, the Embarcadero at Market Street, San Francisco, California.

UMTA will consider all substantive comments at the conclusion of the comment period and will prepare the Final Environmental Impact Statement incorporating mitigation measures and revisions as necessary.

Sincerely,

Brigid Hynes-Cherin
Western Area Director

Enclosure

REF 388.47 M925d

Muni Metro turnaround
project : draft
1988.

MUNI METRO TURNAROUND FACILITIES
SAN FRANCISCO, CALIFORNIA

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

SUBMITTED PURSUANT TO THE NATIONAL ENVIRONMENTAL
POLICY ACT 42 U.S.C. 4332(2)(c)

BY THE

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

AND

THE CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

8/12/88
DATE OF APPROVAL

Brigid Hynes-Cherin
FOR UMTA
Brigid Hynes-Cherin, Western Area Director

8/8/88
DATE OF APPROVAL

Merrill R. Cohn
FOR CITY AND COUNTY OF SAN FRANCISCO
Merrill Cohn, Project Manager

Muni Metro Turnaround
Project

DRAFT ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

SAN FRANCISCO MUNICIPAL RAILWAY
SAN FRANCISCO PUBLIC UTILITIES COMMISSION

August, 1988

3 1223 04289 7174

S F PUBLIC LIBRARY

MUNI METRO TURNAROUND FACILITIES
SAN FRANCISCO, CALIFORNIA

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

SUBMITTED PURSUANT TO THE NATIONAL ENVIRONMENTAL
POLICY ACT 42 U.S.C. 4332(2)(c)

BY THE

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

AND

THE CITY AND COUNTY OF SAN FRANCISCO, CALIFORNIA

DATE OF APPROVAL	FOR UMTA Brigid Hynes-Cherin, Western Area Director
DATE OF APPROVAL	FOR CITY AND COUNTY OF SAN FRANCISCO Merrill Cohn, Project Manager

The following persons may be contacted for additional information concerning this document:

UMTA REGION	CITY OF SAN FRANCISCO
Ms. Carmen Clark Urban Mass Transportation Administration 211 Main Street, Suite 1160 San Francisco, CA. 94105 (415) 974-7317	Mr. Merrill R. Cohn, Project Manager Public Utilities Commission Utilities Engineering Bureau 1155 Market Street San Francisco, CA. 94103 (415) 554-0737

Abstract

The Turnaround Project Study Area is located in San Francisco along The Embarcadero from Clay Street to Brannon, with Davis and Beale serving as the western project boundaries. The project involves improving the turnback operation of the MUNI Metro System at the eastern terminus of the Market Street subway. The alternatives to be studied are as follows:

1. Surface Alternative: MUNI Metro turnback operation would occur at two surface locations between Howard and Bryant in the median of the Embarcadero Parkway. Portal would be located north of Howard Street.

2. Underground Alternative: Turnback operations would occur exclusively underground in a tunnel below the Embarcadero Parkway. Portal and storage track would be located immediately south of Howard Street.

3. Transportation System Management Alternative: The existing turnback facility at the Embarcadero Station would be retained. Operational improvements related to faster train movements in the Market Street subway would be implemented.

4. No Action Alternative: No change to the existing MUNI Metro facilities or system operation.

Impacts to adjacent land uses, parklands, historical resources, traffic and transportation along The Embarcadero and existing structures are examined. Additionally, noise, dust vibration, visual, and other construction and operation impacts are studied. An economic analysis for the Turnaround Project alternatives is provided.

The information in the Environmental Impact Statement is utilized by local decision makers to choose the preferred alternative.

Comments

Comments on this Draft EIS may be submitted in writing or may be made orally at a Public Hearing. Written comments should be submitted to the City and County of San Francisco at the above listed address. Information on the public hearing can also be obtained from the above listed addresses.

TABLE OF CONTENTS

SUMMARY

S.1 PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) S-1

S.2 PROJECT PURPOSE AND NEED S-1

S.3 SUMMARY OF ALTERNATIVES CONSIDERED S-2

S.4 SUMMARY OF POTENTIAL SIGNIFICANT IMPACTS S-5

S.4.1 Unmitigated Significant Impacts S-5
S.4.2 Surface Alternative S-5
S.4.3 Underground Alternative S-7
S.4.4 Transportation Systems Management Alternative S-7
S.4.5 No-Action Alternative S-7

S.5 FINANCIAL SUMMARY S-12

S.5.1 Capital Costs S-12
S.5-2 Operation and Maintenance Costs S-12

CHAPTER 1

1. PURPOSE AND NEED 1-1

1.1 HISTORY OF MUNI METRO AND PROJECT ORIGIN 1-1

1.1.1 History of MUNI 1-1

1.1.2 Development and Improvement of MUNI Metro 1-1

1.1.3 Plans and Actions which Identified the Proposed Project 1-2

1.1.4 Current MUNI Metro Operations 1-3

1.1.5 Transportation Goals and Objectives 1-6

1.2 PURPOSE AND NEED FOR THE TURNAROUND FACILITIES 1-7

1.2.1 Need for Service Improvement of MUNI Metro System .. 1-7

1.2.2 Purpose of the Turnaround Facilities 1-7

1.3 PLANNING CONTEXT 1-10

1.3.1 The Planning and Project Development Process 1-10

1.3.2 The Role of the DEIS in Project Development 1-10

1.3.3 Decision at Hand - Choice of an Alternative 1-11

1.3.4 The Embarcadero Parkway Project 1-11

1.3.5 MUNI Metro Extension to Mission Bay 1-11

CHAPTER 2

2. DESCRIPTION OF THE PROPOSED PROJECT ALTERNATIVES 2-1

2.1 PROJECT LOCATION 2-1

2.2 ALTERNATIVES SELECTION AND SCREENING PROCESS 2-1

2.2.1 Alternatives Considered 2-1

2.2.2 Scoping of Alternatives 2-1

2.3 DEFINITION OF ALTERNATIVES 2-4

2.3.1 Alternative 1 - Embarcadero Surface Alignment 2-4

2.3.2 Alternative 2 - Embarcadero Underground Alignment .. 2-6

2.3.3 Alternative 3 - Transportation Systems Management .. 2-8

2.3.4 Alternative 4 - No-Action Alternative 2-9

2.4 CONCEPTUAL CAPITAL COST ESTIMATE 2-11

2.4.1 General 2-11

2.4.2 Fixed Facilities 2-11

2.4.3 Rolling Stock 2-13

2.4.4 Budget Estimate 2-13

2.4.5 TSM Cost Estimate 2-14

2.4.6 Miscellaneous Capital Costs 2-15

2.5 OPERATIONS AND MAINTENANCE EXPENSE 2-16

2.5.1 General 2-16

CHAPTER 3

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT 3-1

3.1 LAND USE, PLANNING AND PUBLIC POLICY 3.1-1

3.1.1 Introduction 3.1-1

3.1.2 Existing Land Uses 3.1-6

3.1.3 Trends and Planned Land Uses 3.1-9

3.1.4 Relationship of Land Use Trends to Transportation Projects 3.1-12

3.1.5 Plans and Policies 3.1-14

3.2 SOCIAL AND COMMUNITY CHARACTERISTICS 3.2-1

3.2.1 Population and Affected Social Groups 3.2-1

3.2.2 Housing and Neighborhoods 3.2-3

3.2.3 Public Services 3.2-3

3.3 ECONOMIC AND FINANCIAL CHARACTERISTICS 3.3-1

3.3.1 Urban Economy 3.3-1

3.3.2 Fiscal Profiles 3.3-2

3.4 TRAFFIC AND TRANSPORTATION 3.4-1

3.4.1 Public Transportation Circulation 3.4-1

3.4.2 Traffic Volumes/Roadway Capacities 3.4-1

3.4.3 Parking Facilities 3.4-5

3.4.4 Transportation Plan 3.4-5

3.4.5 Pedestrian Traffic 3.4-13

3.4.6 Port of San Francisco Operations/Plans 3.4-13

3.4.7 Goods Movement 3.4-13

3.5 URBAN DESIGN 3.5-1

3.5.1 Urban Design Considerations 3.5-1

3.6 AIR QUALITY 3.6-1

3.6.1 Relevant Pollutants 3.6-1

3.6.2 Regional Compliance with Standards 3.6-4

3.7 NOISE AND VIBRATION 3.7-1

3.7.1 Existing Noise and Vibration Sources 3.7-1

3.7.2 Existing Noise Levels and Receptors 3.7-1

3.7.3 Noise Standards and Evaluation of Existing Levels .. 3.7-5

3.8 ENERGY 3.8-1

3.8.1 Regional Energy Demand 3.8-1

3.8.2 Local Setting 3.8-1

3.8.3 MUNI Metro Energy Requirements 3.8-2

3.8.4 Energy Requirements for Existing Bus Service in the Project Area 3.8-2

3.9 EXISTING STRUCTURES AND GEOTECHNICAL CONDITIONS 3.9-1

3.9.1 Geology and Site History 3.9-1

3.9.2 Groundwater 3.9-4

3.9.3 Seismicity/Liquefaction Potential 3.9-4

3.9.4 Description of Existing Structures 3.9-5

3.10 WATER RESOURCES 3.10-1

3.10.1 Surface Water Resources/Runoff and Water Quality 3.10-1

3.10.2 Groundwater Resources 3.10-1

3.10.3 Floodplains/Wetlands 3.10-2

3.11 BIOLOGY 3.11-1

3.11.1 Terrestrial Vegetation 3.11-1

3.11.2 Terrestrial Wildlife 3.11-1

3.11.3 Marine Vegetation 3.11-1

3.11.4 Marine Wildlife 3.11-1

3.11.5 Rare, Threatened and Endangered Species 3.11-1

3.12 HAZARDOUS MATERIALS 3.12-1

3.12.1 Historical, Archival, and Agency Records 3.12-3

3.12.2 Abatement and Remedial Action Sites 3.12-2

3.13 HISTORIC AND CULTURAL RESOURCES (SECTION 106) 3.13-1

3.13.1 Introduction 3.13-1

3.13.2 Applicable Legal and Regulatory Requirements 3.13-1

3.13.3 Historic Resources Potentially Affected 3.13-5

3.14 PARKLANDS (SECTION 4(f)) 3.14-1

3.14.1 Applicable Legal and Regulatory Requirements 3.14-1

3.14.2 Description of Potentially Affected Sites 3.14-2

CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES AND PROPOSED MITIGATION 4-1

4.1 LAND USE, PLANNING AND PUBLIC POLICY 4.1-1

4.1.1 Land Use 4.1-1
4.1.2 Plans and Policies 4.1-3

4.2 SOCIAL AND COMMUNITY CHARACTERISTICS 4.2-1

4.2.1 Residential Population and Affected Social Groups 4.2-1
4.2.2 Housing 4.2-1
4.2.3 Transportation Disadvantaged 4.2-2

4.3 ECONOMIC AND FINANCIAL CHARACTERISTICS 4.3-1

4.3.1 Urban Economy 4.3-1
4.3.2 Fiscal Impacts 4.3-3
4.3.2.1 General 4.3-3
4.3.2.2 Port of San Francisco 4.3-3
4.3.2.3 Recreation and Park Department 4.3-4
4.3.2.4 Municipal Railway 4.3-5

4.4 TRAFFIC AND TRANSPORTATION 4.4-1

4.5 URBAN DESIGN 4.5-1

4.5.1 Introduction 4.5-1

4.6 AIR QUALITY 4.6-1

4.7 NOISE 4.7-1

4.8 ENERGY 4.8-1

4.9 CONSTRUCTION METHODS 4.9-1

4.9.1 Cut and Cover Slurry Wall Construction 4.9-1
4.9.2 Tunnel Construction 4.9-4
4.9.3 U-Wall Construction 4.9-6
4.9.4 Seismicity/Liquefaction Potential 4.9-7
4.9.5 Utility Relocation 4.9-8

4.10 WATER RESOURCES 4.10-1

4.11 BIOLOGY 4.11-1

4.12 HAZARDOUS MATERIALS 4.12-1

4.13 HISTORICAL AND CULTURAL RESOURCES (SECTION 106 COMPLIANCE) 4.13-1

4.13.1 Coordination with State and Local Historic Preservation Agencies 4.13-3

4.14 PARKLANDS (SECTION 4(f) COMPLIANCE) 4.14-1

4.15 POTENTIAL SECONDARY IMPACTS OF THE MUNI METRO TURNAROUND PROJECT 4.15-1

4.16 CUMULATIVE IMPACTS 4.16-1

4.17 UNMITIGATED SIGNIFICANT IMPACTS 4.17-1

CHAPTER 5

5. EVALUATION OF ALTERNATIVES 5-1

5.1 SERVICE IMPROVEMENTS 5-1

5.2 SUMMARY OF SIGNIFICANT IMPACTS 5-1

5.2.1 Surface and Underground Alternatives 5-1
5.2.2 Transportation System Management and No-Action Alternatives 5-2

5.3 CAPITAL AND OPERATING/MAINTENANCE COSTS 5-3

5.4 LOCAL PRIORITIES FOR RAIL MODIFICATION PROGRAMS 5-3

5.5 CAPITAL FUNDING PLAN 5-3

REFERENCES/AGENCY CONTACTS

REFERENCE DOCUMENTS
(Available for Inspection at the Public Utilities Commission Utilities Engineering Bureau, 1155 Market Street, San Francisco.)

1. OPERATIONS SUMMARY REPORT

2. FINAL ENGINEERING REPORT
   JUNE 10, 1988; B-263

3. GEOTECHNICAL REPORT

4. SCOPING REPORT

5. MUNI METRO TURNAROUND
EMBARCADERO URBAN DESIGN STUDY
JULY 29, 1987; B-199

6. CONCEPTUAL COST ESTIMATE
JUNE 3, 1988; B-261

7. ADDITIONAL OPERATIONS STUDIES - TASK NO. 10
TRAIN CONTROL AND VEHICLE IMPROVEMENTS
MARCH 31, 1987; B-181

8. MUNI METRO TURNAROUND PROJECT
TASKS A1 AND 7A; PATRONAGE PROJECTIONS
DKS ASSOCIATES, JULY 1987

9. SAN FRANCISCO MUNICIPAL RAILWAY METRO
TURNAROUND PROJECT PLANS AND POLICIES REPORT

10. SAN FRANCISCO MUNICIPAL RAILWAY METRO TURNAROUND
PROJECT HISTORICAL AND CULTURAL RESEARCH TO 1887

11. ADDITIONAL OPERATIONS STUDIES - TASK NO. 8
ANALYSIS OF PORTAL LOCATION AND LOCATION
OF TURNAROUND FACILITIES ON THE SURFACE
EXTENSION, MARCH 27, 1987, B-179

GLOSSARY

LIST OF PREPARERS

APPENDICES

I. NOTICE OF INTENT I-1

II. AGENCY RESPONSE TO THE NOTICE OF INTENT II-1

III. SUMMARY OF APPLICABLE PLANS AND POLICIES III-1

REQUIRED PERMITS AND APPROVALS III-6

LIST OF FIGURES

Figure | Page

S.3-1 Alternative 1, Embarcadero Surface Alignment S-3

S.3-2 Alternative 2, Embarcadero Underground Alignment S-4

S.3-3 Alternatives 3 and 4, Transportation Systems Management and No Action S-6

2.1-1 MUNI Metro Turnaround Project Study Area and Southern Extension 2-2

2.1-2 Enlargement of MUNI Metro Turnaround Project Study Area 2-3

2.3-1 Alternative 1, Embarcadero Surface Alignment 2-5

2.3-2 Alternative 2, Embarcadero Underground Alignment 2-7

2.3-3 Alternatives 3 and 4, Transportation Systems Management and No Action 2-10

3.1-1 Land Use Study Area 3.1-2

3.1-2 Land Use Map 3.1-3

3.1-3 Zoning Map 3.1-4

3.1-4 Height and Bulk Map.. 3.1-5

3.1-5 San Francisco Redevelopment Project Areas 3.1-8

3.1-6 Cumulative Map 3.1-10

3.1-7 Rincon Hill Plaza 3.1-13

3.1-8 San Francisco Agency Jurisdictions 3.1-15

3.3-1 San Francisco Zip Code Map 3.3-3

3.4-1 MUNI Lines in Project Area 3.4-2

3.4-2 Embarcadero Parkway Project Design 3.4-7

3.4-3 MUNI Metro Extension 3.4-9

3.4-4 Peninsula Commute Service (San Francisco to San Jose) 3.4-12

3.5-1 Urban Design Photo Survey for the Project Area 3.5-2

3.5-2 Urban Design Photo Survey for the Project Area 3.5-3

LIST OF FIGURES (CONTINUED)

Figure Page

3.5-3 Urban Design Photo Survey for the Project Area 3.5-4

3.5-4 Urban Design Photo Survey for the Project Area 3.5-5

3.5-5 Urban Design Photo Survey for the Project Area 3.5-6

3.5-6 Urban Design Photo Survey for the Project Area 3.5-7

3.7-1 Sound Measurement Locations 3.7-2

3.7-2 Existing Sound Level Contours in CNEL 3.7-4

3.9-1 San Francisco Bay Shoreline at Market Street in 1853 .... 3.9-2

3.9-2 Existing MUNI Metro Facilities at Embarcadero Station 3.9-7

3.9-3 Plan of Existing Embarcadero Freeway 3.9-9

3.9-4 Typical Cross Sections of the Existing Embarcadero Freeway 3.9-10

3.12-1 Locations of Removed or Monitored Underground Storage Tanks Within 100 Feet of Proposed Excavation 3.12-4

3.13-1 Project Study Area 3.13-2

3.13-2 Historic Resources 3.13-6

3.13-3 Sunken Goldrush Era Store Ships 3.13-12

3.14-1 Locations of Section 4(f) Park and Recreation Areas 3.14-4

3.14-2 Photographs of the Justin Herman Plaza 3.14-5

3.14-3 Photographs of the Bayfront Promenade 3.14-8

4.4-1 MUNI Metro Turnaround Traffic Detour Plan 4.4-2

4.4-2 Year 2000 Design Volume 4.4-5

4.4-3 Maximum Queuing with Full Priority 4.4-7

4.5-1 Surface Alternative 4.5-4

4.5-2 Surface Alternative - Southeast from Harrison and The Embarcadero 4.5-5

4.5-3 Surface Alternative - Turnaround Section 4.5-6

LIST OF FIGURES (CONTINUED)

Figure | Page
4.5-4 Surface Alternative - Howard Street 4.5-7
4.5-5 Surface Alternative - Howard Street Intersection Plan 4.5-8
4.5-6 Surface Alternative - Bryant Street 4.5-9
4.5-7 Surface Alternative - Folsom Street Intersection Plan 4.5-11
4.5-8 Surface Alternative - Harrison Street 4.5-13
4.5-9 Surface Alternative - South Towards Waterfront from East Street ROW 4.5-14
4.5-10 Underground Alternative 4.5-16
4.5-11 Underground Alternative from Promenade Looking South at Waterfront Park 4.5-17
4.5-12 Underground Alternative from Waterfront Looking North at Portal Area 4.5-19
4.9-1 Cut and Cover Construction, Stage Three 4.9-2
4.16-1 Schedule for Embarcadero Parkway Related Projects 4.16-3

LIST OF TABLES

Table		Page
S.4	Summary of Significant Environmental Effects	S-8
1.2-1	MUNI Metro Patronage Projections, Two Hour P.M. Peak Period	1-7
1.2-2	Volume to Capacity Ratio Summary	1-8
1.2-3	Surface Alternative Delay Comparisons with 2006 Schedule	1-9
2.4-1	Project Cost Summary in 1988 (Millions of Dollars)	2-11
2.4-2	Fixed Facility Cost Estimate Summary for Surface and Underground Alternatives	2-12
2.4-3	Rolling Stock Cost Estimate Summary for Surface and Underground Alternatives	2-13
2.4-4	Fixed Facility Budget Estimate for Surface and Underground Alternatives (Millions of Dollars)	2-14
2.4-5	TSM Summary - Alternative No. 3	2-14
2.5-1	Annual Additional Operations and Maintenance Expenses, 1987 (Millions of Dollars)	2-16
3.2-1	Citywide Population	3.2-2
3.2-2	Study Area Population	3.2-2
3.2-3	Population Change in Study Area by Census Tracts (1960-1985)	3.2-2
3.3-1	MUNI Operating Costs, FY 1981-1982 to FY 1985-1986 (Millions of Dollars)	3.3-8
3.3-2	MUNI Operating Revenue Sources, FY 1981-1982 to FY 1985-1986 (000's)	3.3-8
3.4-1	Traffic Circulation Along The Embarcadero (P.M. Peak Hour) ...	3.4-3
3.4-2	Levels of Service for Urban and Suburban Arterial Streets	3.4-4
3.6-1	Emission Rates for San Francisco (Tons Per Day)	3.6-2
3.6-2	Existing 1987 Total Concentrations for Carbon Monoxide	3.6-3

LIST OF TABLES (CONTINUED)

Table		Page
3.7-1	Measured Sound Levels in the Project Area	3.7-3
3.8-1	Statewide Electricity Sales (12 Month Ended Through December, Billions of Kilowatt Hours)	3.8-1
3.8-2	MUNI Energy Consumption, 1983	3.8-2
3.12-1	Leaking Underground Petroleum Storage Tanks Being Monitored or Previously Removed	3.12-3
3.13-1	Historic Building and Elements in MUNI Metro Turnaround Area of Potential Environmental Impact	3.13-3
3.13-2	Gold Rush Era Storeships in Turnaround Study Area, North and South of Market	3.13-11
3.14-1	Existing and Proposed Parks and Recreation Areas Within the Areas of Potential Environmental Impact of the MUNI Metro Turnback Alternatives	3.14-3
4.3-1	Construction Related Economic Impacts of the Surface Alternative and the Underground Alternative	4.3-2
4.3-2	Annual Cost to the City and County of San Francisco for Surface and Underground Alternatives (Millions of Dollars: 1988)	4.3-3
4.3-3	Annual Cumulative Operation and Maintenance Cost (Millions of Dollars)	4.3-6
4.4-1	Projected Year 2000 Level of Service Along The Embarcadero	4.4-4
4.7-1	Typical Construction Equipment Noise Before and After Mitigation	4.7-2
4.8-1	Total Construction Energy Consumed	4.8-2

SUMMARY

S.1 PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

The Draft EIS provides the interested public, reviewing agencies, and the decision makers in San Francisco with information necessary to make an informed choice as to the transportation investment most appropriate to facilitate the turnback of MUNI Metro trains at the terminus of the Market Street subway. The Draft EIS documents the environmental impacts and the cost comparisons of each alternative examined relative to the project goals. Specifically, Chapter 1 presents historical information regarding MUNI and the Metro system. Chapter 2 defines the alternatives and provides capital and operating costs per alternative. Chapter 3 describes the existing environment of the project study area. Chapter 4 details the environmental impacts anticipated during construction and after project completion and their respective mitigation measures. Chapter 5 provides a summary evaluation of alternatives, comparing costs and financing with the benefits expected.

Before selecting a preferred alternative, the San Francisco Public Utilities Commission (SFPUC) seeks the community's input to the Draft EIS by conducting public hearings. Specific dates and times are announced in local newspapers. The SFPUC will be seeking comments from the community in order to recommend an alternative that best reflects the community's needs and is environmentally sound. While the document identifies many of the anticipated environmental impacts, others may be raised during the commenting period. A comment period of 45 days begins with the publication of the Notice of Availability of the Draft EIS.

Responses to public comments will be prepared, and, as necessary, additional environmental analysis will be performed. These materials will then be incorporated into a Final EIS which identifies the preferred alternative. The Final EIS is certified by the San Francisco Public Utilities Commission prior to submittal to the Urban Mass Transportation Administration (UMTA) for review and approval. Project implementation cannot proceed until 30 days after UMTA approves the Final EIS.

S.2 PROJECT PURPOSE AND NEED

The MUNI Metro System must be capable of carrying the expected growth in patronage over the next 20 years. This growth has been estimated by the City of San Francisco to be 12 percent. Thus, the two hour P.M. peak load at Van Ness is expected to increase from 11,800 passengers to a high range of 13,400 passengers by 2005 (Bechtel, 1987G).

The operating plan and schedule prepared by Manuel Padron (Padron and Associates, 1987) to meet projected demand requires the number of trains to be increased from 20 (1987 schedule) to 30 per hour. Thus, the headway decreases from 3 to 2 minutes.

Operation simulations by the George Beetle Company indicate that the present terminal layout can not handle the increased number of trains. The eastbound (inbound) trains back up from the Embarcadero crossover all the way to Van Ness Station (George Beetle Company, 1987).

Although there are other improvements, such as Transportation Systems Management measures, which could provide slight increases in peak hour capacity to help meet this growth in patronage, sufficient improvements can not be implemented within the 20 year period to accommodate the anticipated growth in ridership. Thus, the construction of new turnback facilities is being considered.

The purpose of the project is to provide a more efficient turnback track configuration that will handle the 20 year growth in traffic. The build alternatives would also provide the opportunity for future connection of a southern extension of MUNI Metro to Mission Bay.

S.3 SUMMARY OF ALTERNATIVES CONSIDERED

ALTERNATIVE 1 - EMBARCADERO SURFACE ALIGNMENT

The Embarcadero Surface Alternative would begin at the eastern end of the Embarcadero Station and proceed northeast in twin tunnels beneath Market Street, generally over the BART tunnels, to Steuart Street (see Figure S.3-1). The tunnels would curve to the right under Justin Herman Plaza to a ventilation structure under the Embarcadero Roadway and clear of the Plaza. The main tracks would then continue southeasterly in subway open cut structure, then curve to the right under the elevated Embarcadero Freeway near the Mission Street intersection. Between Mission and Howard Streets, the tracks ascend to a portal and surface alignment in the median of the Embarcadero Roadway at Howard Street. The surface tracks would continue southeast in The Embarcadero median through reverse curves to the north line of Folsom Street. A center track for turning a four-car train would be provided in this block between Howard and Folsom. The tracks continue in The Embarcadero median across Folsom Street, Harrison Street, and to the north side of Bryant Street. In the last block the main tracks spread to accommodate two center tracks.

ALTERNATIVE 2 - EMBARCADERO UNDERGROUND ALIGNMENT

The Embarcadero Underground Alternative would have a tunnel section similar to Alternative 1, continuing from the existing Spear Street Shaft to a ventilation structure under the Embarcadero Roadway clear of Justin Herman Plaza (see Figure S.3-2). The main tracks would continue southeasterly in a subway open cut structure then curve to the right under the Embarcadero Freeway and close to the westerly property line of The Embarcadero between Mission and Howard Streets. The main tracks spread for a center turnback track with access from both ends followed by a second center track with access only from the north. The main tracks would then ascend to the median of the realigned Embarcadero Parkway south of Howard Street. One main track would continue on the surface across Folsom Street and 330 feet beyond for temporary storage of a 4-car disabled train. All turnback movements would occur underground; surface track would be less extensive than in Alternative 1.

ALTERNATIVE 3 - TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) Alternative is a low cost approach to addressing transportation problems in the corridor. It also provides a baseline against which all of the major investment alternatives are measured. The TSM Alternative represents the best that can be done for mobility with the

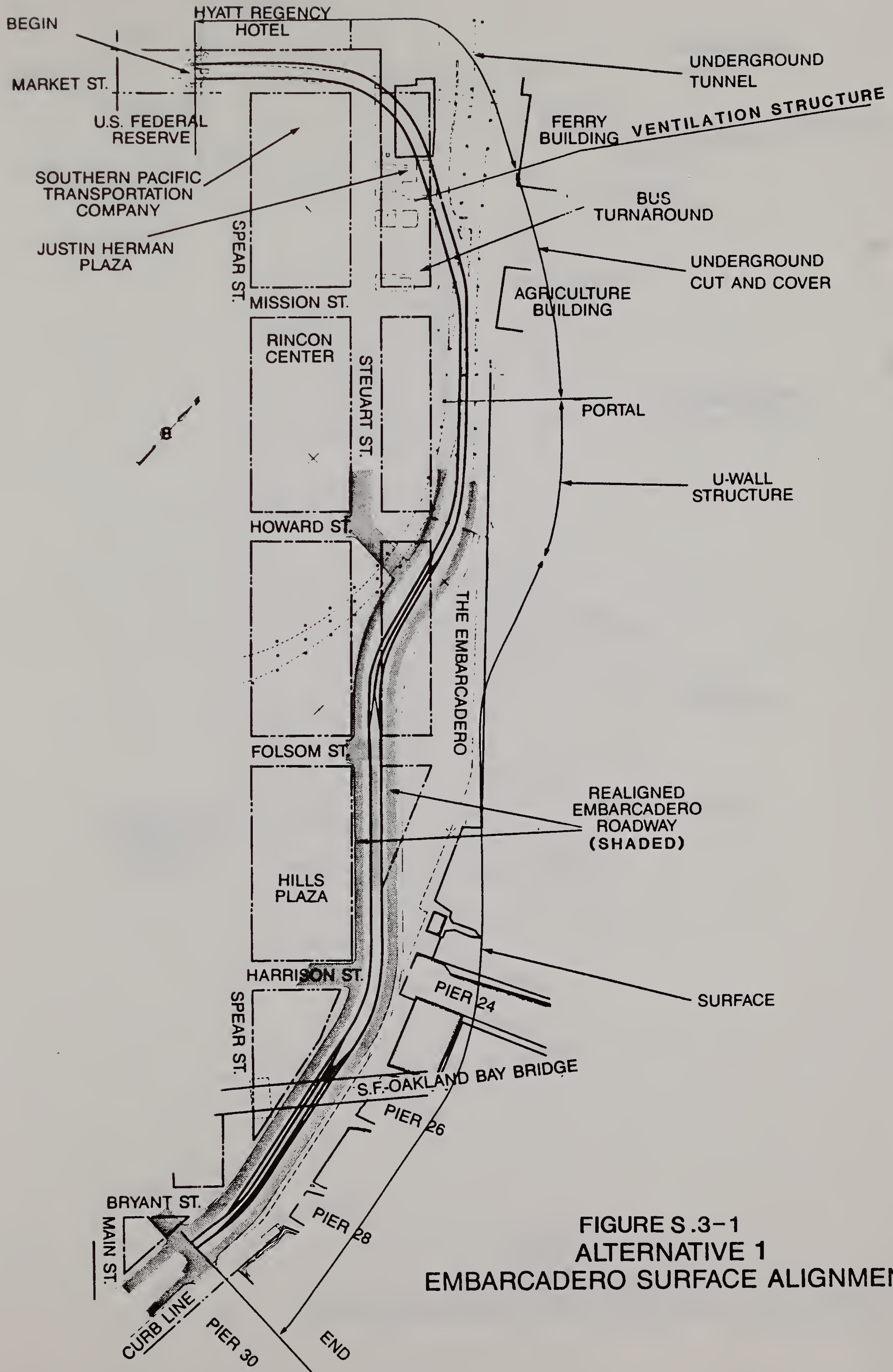

BEGIN
HYATT REGENCY HOTEL
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
SPEAR ST.
MISSION ST.
RINCON CENTER
STEUART ST.
HOWARD ST.
FOLSOM ST.
HILLS PLAZA
HARRISON ST.
SPEAR ST.
BRYANT ST.
MAIN ST.
CURB LINE
PIER 30
END
PIER 28
PIER 26
S.F.-OAKLAND BAY BRIDGE
PIER 24
THE EMBARCADERO
AGRICULTURE BUILDING
FERRY BUILDING
UNDERGROUND TUNNEL
VENTILATION STRUCTURE
BUS TURNAROUND
UNDERGROUND CUT AND COVER
PORTAL
U-WALL STRUCTURE
REALIGNED EMBARCADERO ROADWAY (SHADED)
SURFACE

FIGURE S.3-1
ALTERNATIVE 1
EMBARCADERO SURFACE ALIGNMENT

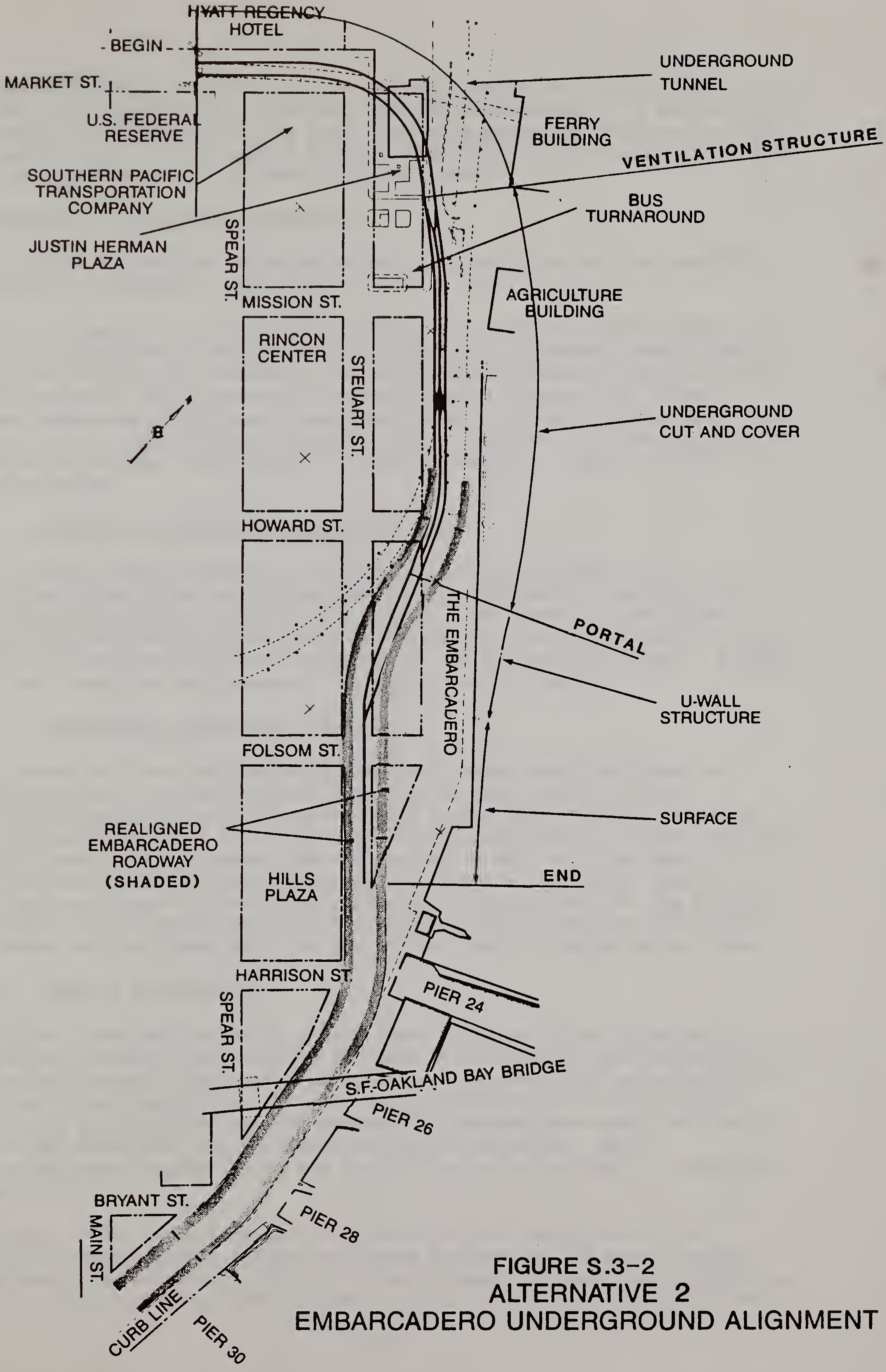

HYATT REGENCY HOTEL
BEGIN
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
SPEAR ST.
MISSION ST.
RINCON CENTER
STEUART ST.
HOWARD ST.
FOLSOM ST.
REALIGNED EMBARCADERO ROADWAY (SHADED)
HILLS PLAZA
HARRISON ST.
SPEAR ST.
BRYANT ST.
MAIN ST.
CURB LINE
PIER 30
PIER 28
PIER 26
S.F.-OAKLAND BAY BRIDGE
PIER 24
END
THE EMBARCADERO
PORTAL
UNDERGROUND TUNNEL
FERRY BUILDING
VENTILATION STRUCTURE
BUS TURNAROUND
AGRICULTURE BUILDING
UNDERGROUND CUT AND COVER
U-WALL STRUCTURE
SURFACE
B

FIGURE S.3-2
ALTERNATIVE 2
EMBARCADERO UNDERGROUND ALIGNMENT

existing infrastructure, that is, without construction of a new transit guideway. For the Turnaround Project, the TSM measures are: 1) vehicle brake modification, 2) controlling the train reversing mechanism from the end car, 3) signal changes, and 4) adding a fourth speed code which would allow trains to travel more quickly in the Market Street subway.

ALTERNATIVE 4 - NO-ACTION ALTERNATIVE

The No-action Alternative is based on existing conditions with no new MUNI facilities nor changes to Metro operation.

As shown in Figure S.3-3, the existing MUNI Metro Market Street subway line ends at the east end of the Embarcadero Station. The present track layout is a two track stub with a crossover located immediately west of the station to reverse direction of the trains. The crossover is signaled for 27 mph, although eastbound trains must immediately slow to 10 mph to enter the station. The present layout allows 20 to 22 trains per hour traveling in the Market Street subway, significantly less than required to meet 20 year projected demand.

S.4 SUMMARY OF POTENTIAL SIGNIFICANT IMPACTS

The following section summarizes the most significant mitigated and unmitigated impacts for each Turnaround Project alternative, particularly those that differentiate alternatives. Short term impacts define those created by construction of the build alternatives. Long term impacts relate to those effects resulting from operation of the Turnaround Project. A table that lists impact by environmental category is also provided.

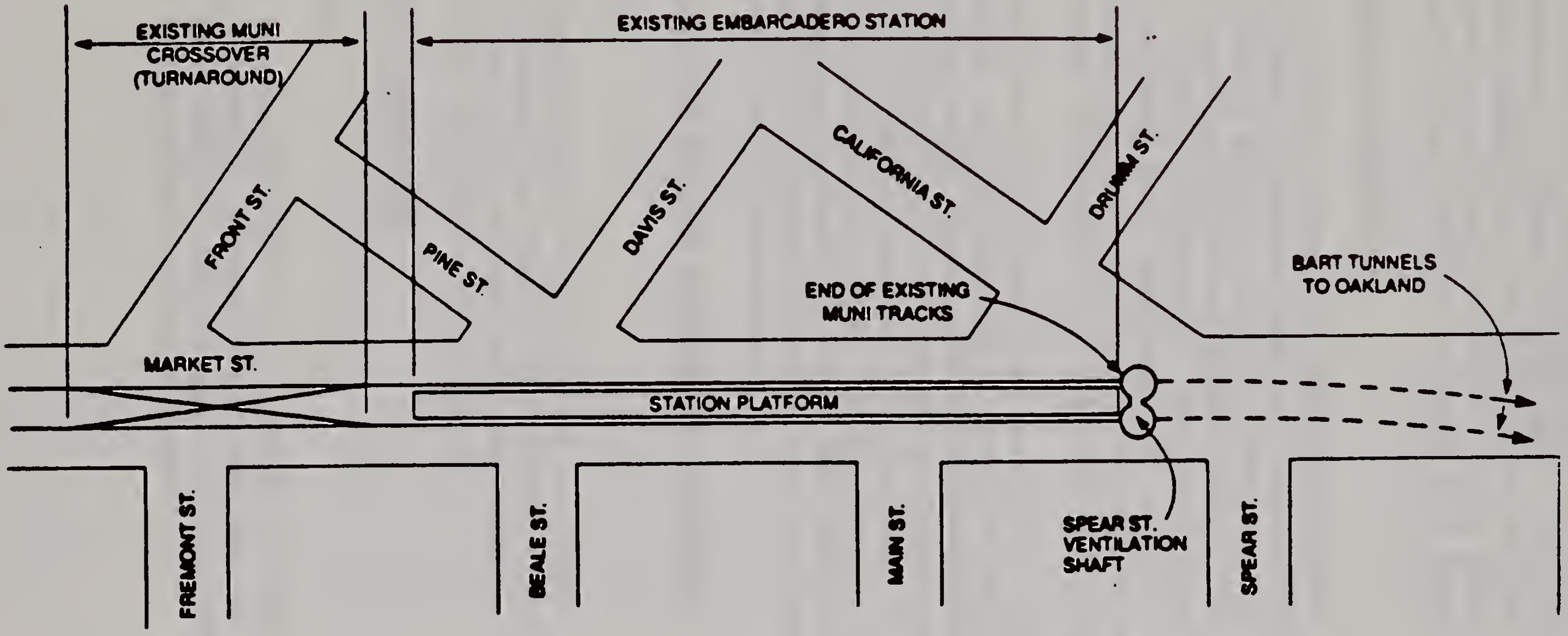
S.4.1 UNMITIGATED SIGNIFICANT IMPACT

There exists only one unmitigated significant impact resulting from the proposed project: visual intrusions during the construction period. Specifically, cut and cover excavation with portal construction will occur along The Embarcadero to Howard Street. The Underground Alternative will have slightly greater visual impact since construction will continue south of Howard Street. Both build alternatives will require the use of disposal and other heavy equipment at the tunnel excavation site adjacent to the MUNI bus turnaround. Hoses necessary for grouting work will be emplaced for a three week period on the grassy knoll in the southern end of Justin Herman Plaza.

S.4.2 SURFACE ALTERNATIVE

Short Term. Construction would extend south to Bryant Street disrupting traffic and pedestrian circulation at three intersections, Folsom/Embarcadero, Harrison/Embarcadero, and Bryant/Embarcadero, that would not be affected by the other build alternative. The cut and cover excavation would require support and stabilization for the Embarcadero Freeway piers and displace 120 Port of San Francisco parking spaces for up to 36 months. Major telecommunication vaults lie in the path of the portal structure; relocation may be costly.

Long Term. Both the Surface and Underground Alternatives provide the operational capability of running 30 trains per hour in the Market Street subway thus accommodating projected 20 year demand. However, with the Surface Alternative, two surface turnback areas create visual and noise intrusions on


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
STATION PLATFORM
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.

SOURCE: BECHTEL NATIONAL, INC.

SCALE
NO SCALE

FIGURE S.3-3 ALTERNATIVE 3 AND 4 TRANSPORTATION SYSTEMS MANAGEMENT AND NO ACTION

the surrounding land uses, particularly at the future Rincon Point waterfront park and the Bayfront Promenade. Surface turnback operation, which requires a broadened roadway, would disrupt pedestrian flow across The Embarcadero, impede access to Piers 24, 26, and 28, and detract from the waterfront environment and activities. Possible queuing of traffic at signalized intersections preempted in favor of MUNI Metro could also occur. Because of the portal location immediately north of Howard Street, Howard Street would be closed to cross traffic at The Embarcadero. As a result, northbound traffic along The Embarcadero would require two left turn lanes at Mission Street.

S.4.3 UNDERGROUND ALTERNATIVE

Short Term. Cut and cover excavation would occur over a longer and wider area, presenting slightly greater risk for cracking of facades of adjacent buildings and affecting greater numbers of Embarcadero Freeway support piers. The cut and cover section could take approximately four months longer to complete than the Surface Alternative. One hundred forty-one Port parking places would be displaced for a maximum of 40 months. Because of the south of Howard portal location, a sewer line may need relocation and access across The Embarcadero at Howard Street would be temporarily disrupted.

Long Term. In addition to providing the requisite capacity gains in the Market Street subway, the Underground Alternative completely conceals turnback operation, thus eliminating visual and noise disturbances to adjacent land uses. Although a surface tail track crossing Folsom would be utilized for temporary storage of disabled trains, the frequency of train movements on the surface would be relatively insignificant compared with the Surface Alternative. Therefore, pedestrian access and traffic circulation would not be impeded. However, the portal location near the future Rincon Point park may intrude visually on the parkscape.

S.4.4 TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

Short Term. None

Long Term. TSM improvements could increase the number of trains per hour in the Market Street subway, but could not provide sufficient capacity (minimum of 30 trains per peak hour) to meet projected demand, a primary goal of the City's Downtown Plan and Transit First policy.

S.4.5 NO-ACTION ALTERNATIVE

Short Term. None.

Long Term. The existing crossover and turnback facility at Embarcadero Station allows a maximum of 22 trains per peak hour to operate in the Market Street subway. This level of service would be the least successful of all alternatives in accommodating projected demand.

TABLE S.4. SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

LAND USE, PLANNING, PUBLIC POLICY	SOCIAL AND COMMUNITY CHARACTERISTICS	ECONOMIC AND FINANCIAL CHARACTERISTICS	TRAFFIC AND TRANSPORTATION	URBAN DESIGN	AIR QUALITY
SURFACE ALTERNATIVE					
Short term. None anticipated.	Short Term and Long Term. None identified.	Short Term. Potential loss of revenue from displaced Port of San Francisco parking. Potential loss of revenue for San Francisco Recreation and Parks Department from construction impacts on scheduled activities at Justin Herman Plaza.	Short Term. Construction will impact the Embarcadero Roadway from Mission to Howard and Steuart Street south of Howard. Access to the Agriculture Building and buildings along The Embarcadero between Mission and Howard will be impeded. Port of San Francisco will lose 121 parking spaces for eight months. Use of MUNI bus turnaround at Steuart Street will be disrupted during construction.	Short Term. Unmitigated visual impacts from construction activities will affect The Embarcadero from Mission through Bryant.	Short Term. Construction related emissions will produce localized CO concentrations.
Long Term. Land use changes will occur in block south of Howard Street along The Embarcadero as a result of Embarcadero Roadway realignment. Increased capacity to accommodate peak hour downtown demand conforms with City of San Francisco Comprehensive Plan and Municipal Railway Short Range Transit Plan 1987-92.		Long Term. Capital costs for vehicles, facilities, TSM improvements, and miscellaneous costs at $71.8 million. Operating and maintenance costs at $1.32 million per year.	Long Term. Traffic delays will occur at Folsom/Embarcadero, Howard/Embarcadero, and Harrison/Embarcadero intersections because of surface train operation. Surface turnback area creates a broadened roadway and barrier to pedestrian circulation across The Embarcadero. Beneficial impacts will occur from added transit capacity, fewer downtown auto trips.	Long Term. Adverse visual impact to East Street ROW buildings because of adjacent portal construction could occur. Careful design will minimize this impact.	Long Term. Beneficial impact from increased use of MUNI Metro, reduced number of auto trips to downtown.
UNDERGROUND ALTERNATIVE					
Short Term. Same as Surface Alternative.	Short Term and Long Term. None identified.	Short Term. Same as Surface Alternative.	Short Term. Same as Surface Alternative except that the number of displaced Port parking spaces would increase to 140 for a 32 month period. The Embarcadero will be affected by cut and cover construction a half block further south than in the Surface Alternative.	Short Term. Same as Surface Alternative.	Short Term. Same as Surface Alternative.
Long Term. Same as Surface Alternative.		Long Term. Capital costs for vehicles, facilities, TSM improvements, and miscellaneous costs at $91.8 million. Operating and maintenance costs at $.87 million per year.	Long Term. Beneficial impact from underground turnaround operations: surface automobile and pedestrian access will not be impacted by turnback operations; conversely, train operations will not be impacted by auto and pedestrian circulation. Beneficial impacts will result from downtown trips on transit rather than by automobile.	Long Term. Visual and physical access to/from the waterfront will not be impacted by turnback operations. Street closures and left hand turn options will be enhanced over surface alternative. Careful design of portal structure could minimize potential barrier impact.	Long Term. Beneficial impacts are the same as those described in the Surface Alternative.

(CONTINUED)

TABLE S.4 (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

LAND USE, PLANNING, PUBLIC POLICY	SOCIAL AND COMMUNITY CHARACTERISTICS	ECONOMIC AND FINANCIAL CHARACTERISTICS	TRAFFIC AND TRANSPORTATION	URBAN DESIGN	AIR QUALITY
TRANSPORTATION SYSTEM MANAGEMENT ALTERNATIVE					
Short Term. None.	N/A	Short Term. None anticipated.	Short Term. None.	N/A	Short Term. None.
Long Term. Cannot provide sufficient capacity to meet projected demand and conform with City planning policies.	N/A	Long Term. Capital costs totaling $1.5 million. Operating costs remain the same.	Long Term. Possibility of more auto trips to downtown as a result of lack of capacity to accommodate growth on MUNI Metro.		Long Term. Possibility of increased air pollution from additional auto trips downtown.
NO-ACTION ALTERNATIVE					
Short Term. None.	N/A	Short Term and Long Term. None	Short Term. None.	N/A	Short Term. None.
Long Term. Cannot provide sufficient capacity to meet projected demand and conform with City planning policies.	N/A		Long Term. Possibility of more auto trips downtown as a result of a lack of capacity to accommodate growth on MUNI Metro.		Long Term. Possibility of increased air pollution from additional auto trips downtown.

- N/A = Not Applicable

TABLE S.4 (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

NOISE	ENERGY	CONSTRUCTION METHODS	WATER RESOURCES	BIOLOGY	HAZARDOUS MATERIALS	HISTORICAL, ARCHAEOLOGICAL, CULTURAL IMPACTS	PARKLANDS
SURFACE ALTERNATIVE							
Short Term							
Noise impacts will occur as a result of construction at Justin Herman Plaza and Bayfront Promenade.	Additional fuel consumption for construction is insignificant.	Tunneling and cut and cover excavation will cause settling, vibration, possible cracking of pavement and building facades. Existing BART/MUNI tunnel and Embarcadero Freeway structures will require additional support. A section of the Embarcadero Roadway between Mission and Howard will be torn up. Underground utilities will need support or relocation. Major telecommunication vault at portal location will require costly relocation.	Dewatering may result in ground settlement in cut and cover construction zone.	Drilling and grouting in Justin Herman Plaza may affect grass and plants.	Presence of hazardous materials may exist at project site. Removal of hazardous materials may delay construction.	Tunneling and cut and cover excavation may uncover artifacts/cultural resources.	Construction activities will generate noise, vibration and dust at Justin Herman Plaza and Bayfront Promenade. Justin Herman Plaza will be adversely affected by grouting activities and possible subsidence. San Francisco Recreation and Parks Department may lose money if revenue producing events can not be scheduled during construction.
Long Term							
Noise from exhaust fan required for underground Metro operation will affect southern end of Justin Herman Plaza. Noise from passing trains will increase noise levels at Rincon Point and residential units at Hills Plaza by 3 dBA. This increase is within City Noise Ordinance limitations.	Additional electrical consumption for MUNI Metro turnback operation is insignificant.	Continued subsidence in construction area may occur.	None anticipated.	None anticipated.	None anticipated.	The Old Seawall and Belt Line Railway will be impacted.	Tunnel exhaust fan placed at southern end of Justin Herman Plaza will generate noise exceeding San Francisco Master Plan standards.

TABLE S.4 (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

NOISE	ENERGY	CONSTRUCTION METHODS	WATER RESOURCES	BIOLOGY	HAZARDOUS MATERIALS	ARCHAEOLOGICAL, CULTURAL IMPACTS	PARKLANDS
UNDERGROUND ALTERNATIVE							
Short Term							
Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative although the major telecommunications vault at Howard Street will not be affected by this alternative. There may be slight additional risk to adjacent buildings and added expense for freeway structure stabilization along The Embarcadero between Mission and Howard because of the wider cut and cover excavation.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.
Long Term							
None anticipated since turnback operation is underground.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.
TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE							
Short Term and Long Term							
N/A	No additional energy requirements.	N/A	N/A	N/A	N/A	N/A	N/A
NO ACTION ALTERNATIVE							
Short Term and Long Term							
N/A	No additional energy requirements.	N/A	N/A	N/A	N/A	N/A	N/A

* N/A = Not Applicable

S.5 FINANCIAL SUMMARY

S.5.1 CAPITAL COSTS

The Turnaround Project requires capital expenditure for fixed facilities and, in the case of the build alternatives, rolling stock. Transportation Systems Management (TSM) improvements need to be implemented as well to realize the full benefit of the build alternatives. The comparison of capital costs are as follows:

PROJECT COST SUMMARY IN 1988 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
Fixed Facilities	60.793	83.262	-	-
Rolling Stock (Turnaround)	9.100	6.500	-	-
TSM	1.500	1.500	1.500	-
Miscellaneous Costs	.402	.621	-	-
TOTAL	71.795	91.883	1.500	0

S.5.2 OPERATION AND MAINTENANCE COSTS

The annual operation and maintenance costs for the Turnaround Project are as follows:

Surface Alternative	$1.32
Underground Alternative	$ .87
TSM Alternative	-
No-Action Alternative	-

The figures include the annual operation and maintenance costs of the new turnback facilities and the additional LRVs required for the Turnaround Project. The difference between the two build alternatives reflects the added route length and operating time required for surface turnback operations and two additional LRVs required by Alternative 1. It does not include miscellaneous costs, such as potential insurance costs related to the surface turnback operations.

Over a 25 year period, the difference in the cumulative operating and maintenance costs for the two build alternatives increases to over $28 million.

CHAPTER 1

1. BACKGROUND PURPOSE AND NEED

1.1 BACKGROUND HISTORY OF MUNI METRO AND PROJECT ORIGIN

1.1.1 HISTORY OF MUNI

The San Francisco Municipal Railway (MUNI) was created in 1912 as the nation's first publicly owned transit system. MUNI's first line operated on Geary Street from Market, and was later augmented by other service to most parts of the City of San Francisco. Its largest competitor was the United Railroads Company (later the Market Street Railway Company). Streetcar service on Market Street was so intensive that four tracks were necessary to handle all the cars.

After the first World War, the transit industry came increasingly under public ownership, and the Market Street Railway was finally purchased by the City in September 1944. Many of the former private company's Market Street lines were converted to trolley coach operation. The cable car lines came to MUNI with the purchase of the Market Street Railway and the California Street Cable Railroad Company in 1952.

During the era when most cities did away with their electrically powered service, San Francisco's was retained and modernized. In recent years, MUNI has converted two diesel bus lines to trolley coach operation, and more electric service is planned. In 1980, the MUNI Metro system opened, putting the light rail services underground in the downtown area, and allowing higher speeds and shorter trips. During a 20 month period from 1982 to 1984, all three cable car lines were completely refurbished at a cost of nearly $60 million, and are now ready to offer both residents and visitors another century of service.

Today, MUNI offers the nation's most varied and comprehensive transit network. In the fiscal year 1986-87, MUNI's operating budget was $226.3 million. The system employs over 3,700 staff, full time and part time. The MUNI fleet now totals over 1,000. Light rail vehicles (LRVs), trolley coaches, cable cars, and motor coaches cover nearly 80 routes, and provide service to all parts of the City. Over 95 percent of the City's addresses are within two blocks of a MUNI stop, and the 850,000 weekday passenger boardings make MUNI America's most heavily used transit system on a per capita basis.

1.1.2 DEVELOPMENT AND IMPROVEMENT OF MUNI METRO

During the 1970s, MUNI's capital improvement efforts centered on the construction and start-up of the MUNI Metro subway/surface light rail system. BART used approximately $140 million of its construction bond proceeds to construct the tunnel and subway stations. MUNI expended an additional $150 million to provide station furnishings, the track, train control and power distribution systems and to procure the basic fleet of 100 Boeing light rail vehicles. Soon after Metro operation began in 1980, ridership on the system exceeded even the most optimistic projections made during the planning and construction phases. Subsequent MUNI capital projects provided the facilities and rolling stock improvements necessary for a 30 percent increase in Metro peak period capacity, e.g., the acquisition of 30 additional LRVs in 1983, the replacement of the Geneva streetcar barn with a modern rail service and shop facility and the construction of Metro Center Annex which houses MUNI's expanded electronics repair and LRV maintenance functions.

Two other significant Metro improvements were begun in the early 1980s in order to enhance the safety and efficiency of the operation: trainlining and Forest Hill Station rehabilitation. Both projects were included in the original plans for Metro operation but had been deferred due to funding and environmental constraints. Trainlining modifications to the Boeing LRVs now allow one operator in a lead car to control the doors, steps, and intercom of a multi-car train. In 1985, MUNI completed a $6 million renovation to Forest Hill Station to provide improved ventilation, handicapped access, and station amenities. The renovation provides the Forest Hill Station with safety and convenience comparable to the other Metro stations while preserving the original architectural integrity of the station built in 1918.

To address problems of vehicle and service reliability in the Metro system, MUNI has made a series of modifications to components of the Boeing LRV fleet, such as couplers and air compressors, that have been prone to in-service failures or require excessive on-going maintenance.

1.1.3 PLANS AND ACTIONS WHICH IDENTIFIED THE PROPOSED PROJECT

Plans for an improved turnback facility immediately east of the Embarcadero Station have been discussed by the San Francisco Municipal Railway and Public Utilities Commission for over a decade. In September 1978, a Draft Environmental Statement, Market Street Subway-MUNI Track Extension (EDAW), prepared for the U.S. Department of Transportation examined eight alternatives to construct a track extension and turnaround facility for the soon to be operational MUNI Market Street subway. It was known at that time that the track arrangement immediately west of the Embarcadero Station might not be adequate to reverse train direction and maintain sufficient peak hour headways commensurate with projected demand.

A design report for a Track Extension and Turnaround (Sverdrup/Foster, 1978), was simultaneously released with the Draft EIS. The design report investigated alternatives to provide an efficient turnaround and greater operational flexibility at the downtown terminus of the MUNI Market Street subway. Two general concepts were examined, a crossover easterly of Embarcadero Station and various loops easterly of the station.

Of the alternative designs, Loop Alternative No. 5 which generally encircled the southern portion of Justin Herman Plaza in the right-of-way of Market, Spear, Mission, and The Embarcadero was chosen.

The initial San Francisco Municipal Railway Short Range Transit Plan 1979-84 (1979) extracted information from the aforementioned reports and set a high priority for capital grant funding to construct a turnaround facility.

Additionally, a comprehensive examination of transportation/circulation improvements along the waterfront south of Market Street, entitled I-280 Transfer Concept Program Environmental Impact Report (San Francisco, 1984), was published by the City of San Francisco and the California Department of Transportation and included the MUNI Metro Turnaround facility, based on the recommendation of the 1978 Sverdrup/Foster report, and southern extension to China Basin as elements of six alternatives examined.

In September 1984, the San Francisco Public Utilities Commission released a Request for Proposals (RFP), Design of San Francisco Municipal Railway MUNI Metro Turnaround Facilities Easterly of Embarcadero Station. The RFP stated:

> "It is proposed to extend the tracks east of the station in order to provide a more efficient arrangement which will:
>
> - accommodate the more frequent and reliable turnaround of the MUNI Metro trains;
> - provide supplementary tracks for storage space for additional cars to meet peak demands;
> - store disabled cars without interfering with subway operations; and
> - facilitate a future service extension to the south."

1.1.4 CURRENT MUNI METRO OPERATIONS

SCHEDULED OPERATIONS

The current MUNI schedule calls for the following surface headways, time between trains, and train consists during the two hour P.M. peak from 4 P.M. to 6 P.M.:

LINE	HEADWAY	TRAIN CONSIST
J-Church	6 minutes	1 car
K-Ingleside	12 minutes	2 cars
L-Taraval	6 minutes	2 cars
M-Ocean View	12 minutes	2 cars
N-Judah	6 minutes	2 cars

The surface lines converge into the subway at an average headway, time between trains, of 180 seconds, which yields 20 trains per hour. The K, L, and M cars couple into four car trains and the J and N cars couple into three car trains. The scheduled peak operation requires 101 cars in service of the 130 car fleet.

ACTUAL OPERATION

Actual coupling strategy varies from that described above. Wide variances in inbound arrival times at the portals tends to decrease the amount of coupling (particularly at Duboce) and increase the number of trains. If none of the J and N cars are coupled, then the average headway in the subway would decrease to 144 seconds, yielding 25 trains per hour. Actual current operation appears to be between 20 and 22 trains per hour.

PASSENGERS CARRIED

Annual single trips on MUNI Metro has been about 39,000,000 passengers for the past two years (San Francisco Municipal Railway Short Range Transit Plan 1987-92, 1987). Weekday boardings average 140,000. Approximately 11,800 passengers pass the maximum load point at Van Ness Station during the P.M. peak period from 4 P.M. to 6 P.M. (DKS Associates, 1987).

TERMINAL OPERATION

The present track layout is a two track stub with a crossover located immediately west of the station to reverse direction of the trains. The crossover is signalled for 27 mph, although eastbound trains must immediately slow to 10 mph to enter the station. Space is provided on the easterly end of each main track to store three vehicles.

Eastbound trains are automatically routed to the next available track by the signal system. Westbound trains are dispatched manually from a local control console. Trains are held a minimal time for schedule. The supervisor can assume local control at any time to reroute trains or remove a disabled car.

The current time to reverse a train is about 90 seconds and is primarily due to the time required for the operator in each vehicle to separately change ends and restart the train before the train can depart.

Current schedules during peak hours require the operation of 20 trains per hour per direction at this terminal. This may increase to 22 trains per hour depending on variations in the amount of coupling at Duboce Portal. Approximately 25 trains per hour per direction can be operated if there are no malfunctions of vehicles or control; this represents the maximum capacity of the current layout, equipment, and operating methods.

TERMINAL CAPACITY

The capacity of the current MUNI Metro system is a function of the train control system, the operating methods and practices, operating reliability, and the terminal track layout at Embarcadero Station. Currently, 20 trains per hour offers 18,600 places of seats and standing room available in westbound (outbound) direction during the afternoon peak (4 to 6 P.M.) (Wong, San Francisco Municipal Railway Service Planning Department, 1986).

TERMINAL CAPACITY DUE TO TRAIN CONTROL

Studies by George Beetle Company (Train Operations Simulation Assessments, George Beetle Co., 1987) have determined that the existing train control system (with nominal Transportation Systems Management improvements) will support a minimum design headway, time between trains, of 90 seconds with uniform 20 second station dwells, time stopped in station, or 100 seconds with actual current average dwells which range from 14 to 42 seconds. From this information, the following capacity comparison can be made:

BASIS	STATION DWELL (IN SECONDS)	MEAN HEADWAY (IN SECONDS)	THROUGHPUT TRAINS/ HOUR
1987 Schedule	14-42	180	20
Improved Schedule J&N Not Coupled	14-42	144	25
Theoretical Design	14-42	100	36
Theoretical Design	20	90	40

It appears that significant improvement of current capacity, even beyond the projected 20 year growth, is possible with the existing train control system.

TERMINAL CAPACITY DUE TO OPERATING METHODS AND PRACTICES

The George Beetle Company studies found that wide variances in operating methods and practices have a significant impact on capacity. The following factors were identified:

a. Variances in the surface train schedules are due to street traffic.

b. Train handling variances reflect the different practices used by MUNI train operators.

c. Station dwell variances reflect variable passenger volumes and train operator practices.

d. Train turning variances reflect the time for the operator to key, walk to other end of LRV, check and prepare the LRV to start; but exclude passenger boarding time.

e. LRV coupling and uncoupling variances reflect the time to assemble and break down four car trains at the two portals.

The adverse effect of these variances has been reduced by the efforts of MUNI management and staff to develop and implement various operating and scheduling strategies since revenue service began in 1980 (San Francisco Municipal Railway, 1987). This is an evolving process, and further improvements are expected. However, significant further reduction of these variances will only be achieved with the introduction of a form of Automatic Train Operation (ATO). The conversion to ATO is discussed in An Evaluation of SELTRAC Automatic Train Control System (Bechtel, 1987-J), and is a long term goal of MUNI, being pursued as a capital improvement separate from the Turnaround Project.

TERMINAL CAPACITY DUE TO OPERATING RELIABILITY

The operating reliability of the LRVs has improved since 1980 due to the preventative maintenance program and design modification program implemented by the MUNI Equipment Maintenance Division. In addition, the reliability of the Duboce Junction turnouts and the Embarcadero crossover has been improved by the replacement of moveable-point frogs with flange bearing frogs. Operating reliability does not limit the current capacity or the proposed operation to handle the 20 year growth.

TERMINAL CAPACITY DUE TO TRACK LAYOUT

Improvements to the above factors since 1980 allow the current Embarcadero terminal layout to function efficiently for a throughput of 20 to 22 trains per hour. However, the two track layout to turn all trains does limit terminal capacity to approximately 25 trains per hour per direction under current operating methods and practices.

1.1.5 TRANSPORTATION GOALS AND OBJECTIVES

The goal of the MUNI Metro Turnaround Project is to improve the operating efficiency and capacity of the Metro. The objectives are to:

- Provide additional capacity to accommodate the growth in ridership on the existing Metro system as forecast by the City for the year 2007.
- Provide the opportunity to reduce coupling of trains at West Portal and Duboce Portal, thus reducing passenger delays and operating expenses.
- Improve operating reliability by nominal cost changes to the vehicles and signal system, as described in the Transportation Systems Management (TSM) alternative.
- Provide side tracks to turnback a significant portion of the trains off the mainline tracks, thus providing an opportunity for a direct connection to a future Metro extension to the south.

1.2 PURPOSE AND NEED FOR THE TURNAROUND FACILITIES

1.2.1 PURPOSE OF THE TURNAROUND FACILITY

The purpose of the project is to provide a more efficient turnback track configuration that would handle the 20 year growth in traffic and would provide the opportunity for future direct rail connection of a southern extension of MUNI Metro to Mission Bay.

1.2.2 NEED FOR SERVICE IMPROVEMENT OF THE MUNI METRO SYSTEM

The MUNI Metro System must be capable of carrying the expected growth in patronage over the next 20 years, in accordance with an efficient operating plan which does not degrade the passenger's ability to find a place on a train. This ability is defined by the peak two hour average volume/capacity ratio in all the operations studies referred to in this document. Capacity of the MUNI light rail vehicle (LRV) is defined as 140 places (68 seated plus 72 standing) at the industry standard of 4 standees per square meter.

PATRONAGE PROJECTIONS

The ridership projections were prepared by DKS Associates based on Recht Hausrath & Associates data and are contained in Reference No. 8. In accordance with directions from the City, these projections are based on employment and housing estimates prepared for the Department of City Planning. Reference No. 8 also contains ridership projections based on regional ABAG estimates of employment and housing. The latter projections were prepared to meet UMTA requirements and to determine the significance of the difference between the two projections. The results of this work are summarized in Table 1.2-1.

TABLE 1.2-1. MUNI METRO PATRONAGE PROJECTIONS, TWO HOUR P.M. PEAK PERIOD

FORECAST SCENARIO	MARKET STREET SUBWAY OUTBOUND AT VAN NESS	PERCENT INCREASE FROM EXISTING
Existing (1986)	11,800	-
Short Range (City 1995) Without Extension	13,140	12.9
Twenty Year (1) (City 2007) Without Extension	13,400	13.6
Twenty Year (2) (ABAG 2005) With Extension	12,240 (3)	3.7

Source: (1) DKS Associates, July 23, 1987.
(2) DKS Associates, December 19, 1986.
(3) ABAG projections include the Southern Extension to Mission Bay; however, this has a minor influence at the Van Ness Station.

FUTURE OPERATING PLAN

A schedule to handle the above patronage projections was prepared based on increasing capacity by reducing headways and increasing efficiency by eliminating coupling of the J and N lines at Duboce Portal. This schedule is based on the following two hour P.M. headways and train consists:

		HEADWAYS (MINUTES)		
LINE	SURFACE CONSIST	STREET OPERATIONS	MARKET STREET SUBWAY	SOUTHERN EXTENSION
J	2	10	10	10
K	2	10		-
L	2	4/6	5	-
M	2	10		-
N	2	4/6	4/6	4/6

The J and N two car trains would operate uncoupled through the subway and on the extension. K, L, and M two car trains would couple at West Portal and operate through the subway, then turnback at the Turnaround. An average of 30 trains per hour direction would operate in the subway during the two hour P.M. peak. The average headway would be two minutes.

The passenger's ability to find a place was tested by calculating the V/C ratio as defined above. The reduced ratio shown in Table 1.2-2 indicates that the proposed operating plan is acceptable.

TABLE 1.2-2. VOLUME TO CAPACITY RATIO SUMMARY

ROUTES	EXISTING OPERATION	PROPOSED FUTURE PLAN
J	0.48	0.45
K	0.68	0.64
L	0.62	0.59
M	0.69	0.65
N	0.56	0.53
Average	0.60	0.57

Other operating plans were tested as described in Reference No. 8. The plan to hold the current headways is very attractive since no additional vehicles are required due to the projected 20 year growth; however, the average V/C ratio was degraded to 0.62.

EMBARCADERO TERMINAL CAPACITY

The ability of the existing Embarcadero Terminal and current Metro operating practices to handle the projected growth of patronage in accordance with the proposed operating plan was tested by operations simulation methods by the George Beetle Company. The results are presented in Reference No. 8 and are summarized in Table 1.2-3.

TABLE 1.2-3. SURFACE ALTERNATIVE DELAY COMPARISONS WITH 2006 SCHEDULE

EASTBOUND DIRECTION

	EXISTING (1) TERMINAL
Trains Operated	63
Trains Delayed	55 (87% delayed)
Average Delay Per Train Delayed (Sec)	268.7
Standard Deviation	191.0
Total Train Delay for Period (Min:Sec)	246:21

WESTBOUND DIRECTION

	EXISTING (1) TERMINAL
Trains Operated	54
Trains Delayed	21 (39% delayed)
Average Delay Per Train Delayed (Sec)	38.6
Standard Deviation	37.5
Total Train Delay for Period (Min:Sec)	16:39

TOTAL EAST + WEST DELAY	263:00 (2)

NOTES

(1) Simulation Request #11, Reference #5

(2) Delay calculation is for the P.M. peak period from 3:50 to 6:00.

The most significant delay occurs to eastbound (inbound) trains approaching the Embarcadero Station to be reversed on one or the two existing turning tracks. During the peak period these trains are delayed an average of 269 seconds and stack up from the Embarcadero Crossover out to Van Ness Station. Given the current operating practices, the increased number of trains cannot be reversed efficiently on the existing two tracks. Since the current operating practices cannot be improved significantly short of the introduction of Automatic Train Operation, a new turnaround facility is required to provide at least three turning tracks.

TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) improvements described in Alternative No. 3 need to be implemented as part of Alternatives 1 and 2 in order to realize the full benefits of a new turnback facility. However, they are not sufficient in themselves to allow the existing Embarcadero Station terminal to handle the future operating plan without similar delay.

1.3 PLANNING CONTEXT

1.3.1 THE PLANNING AND PROJECT DEVELOPMENT PROCESS

Since the City of San Francisco is requesting Federal funding to design and build a turnaround facility, the City must follow guidlines established under the National Environmental Protection Act (NEPA) of 1969 and by Urban Mass Transportation Administration (UMTA), the Federal granting agency. The Federal guidelines found in the UMTA Draft Procedures and Technical Methods for Transit Project Planning, 1986, are utilized to examine and evaluate a range of alternatives, including a "no-action" alternative, that can help the City of San Francisco meet its transportation goals. The San Francisco Public Utilities Commission and Municipal Railway act as the local lead agencies for the Turnaround Project, and, under UMTA guidelines, produce the requisite documentation and public review process to evaluate and choose a preferred alternative. In order to choose a preferred alternative, several steps are required according to NEPA regulations. They include:

1. The alternatives must be presented for public comment at a scoping session.

2. The alternatives and related comments received at the scoping session must be examined for adverse and beneficial impacts, as part of the Environmental Impact Statement (EIS)

3. The Draft EIS is reviewed by the public and local agencies.

4. All comments related to the Draft EIS are responded to and incorporated into the Final EIS.

5. The City adopts a preferred alternative and prepares a Final EIS jointly with UMTA.

6. The City submits a request to UMTA for funding final design and construction.

1.3.2 THE ROLE OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT IN PROJECT DEVELOPMENT

The Draft EIS provides the interested public, reviewing agencies, and the decision makers in San Francisco with information necessary to make an informed choice as to the transportation investment most appropriate to facilitate the turnback of MUNI Metro trains at the terminus of the Market Street subway. The Draft EIS documents the environmental impacts and the cost comparisons of each alternative examined relative to the project goals. Specifically, Chapter 2 defines the alternatives and provides capital and operating costs per alternative. Chapter 3 describes the existing environment of the project study area. Chapter 4 details the environmental impacts anticipated during construction and after project completion and their respective mitigation measures. Chapter 5 provides a summary evaluation of alternatives, comparing costs and financing with the benefits expected.

CHAPTER 2

2. DESCRIPTION OF THE PROPOSED PROJECT ALTERNATIVES

2.1 PROJECT LOCATION

Figure 2.1-1 and Figure 2.1-2 show the project location in San Francisco and the study area for the MUNI Metro Turnaround Project respectively. Of the four project alternatives described below, two provide new turnback facilities along or under the Embarcadero Roadway. A subway would be constructed connecting the existing MUNI Metro Embarcadero Station with the proposed turnback facilities. Two other alternatives require no modification to the existing turnback at Embarcadero Station.

2.2 ALTERNATIVES SELECTION AND SCREENING PROCESS

2.2.1 ALTERNATIVES CONSIDERED

The MUNI Metro Turnaround Project EIS examines four alternatives. They are:

1. Embarcadero Surface Alternative.

2. Embarcadero Underground Alternative.

3. Transportation Systems Management Alternative.

4. No-action Alternative.

Each alternative is described in Section 2.3, Definition of Alternatives.

2.2.2 SCOPING OF ALTERNATIVES

The first step of the NEPA/EIS process requires that the lead agency hold a public scoping meeting to give the public an opportunity to discuss the proposed alternatives and to outline environmental and construction related concerns that should be addressed in the EIS. Public opinion is received orally at the scoping meeting or in writing within 30 days of the meeting.

The scoping of alternatives has evolved through two stages due to a significant change in direction by the City subsequent to the initial scoping process.

Initial Scoping Meeting held on March 5, 1986. A task force of City and Consultant Staff identified and evaluated a wide range of alternative track layouts based on preliminary City requirements for an underground facility to turn back the trains plus additional facilities to store ready and disabled trains, to bypass trains, to perform minor repairs to the vehicles, and to store maintenance of fixed facilities vehicles and equipment. Four underground alternatives were considered as part of the scoping process on March 5, 1986. These alternatives included one stub and three loop alignments, and included tunneling and cut and cover construction methods in the sensitive Market Street section directly over the existing BART tunnels. A Scoping Report was issued on May 30, 1986 by Bechtel Letter B-097.

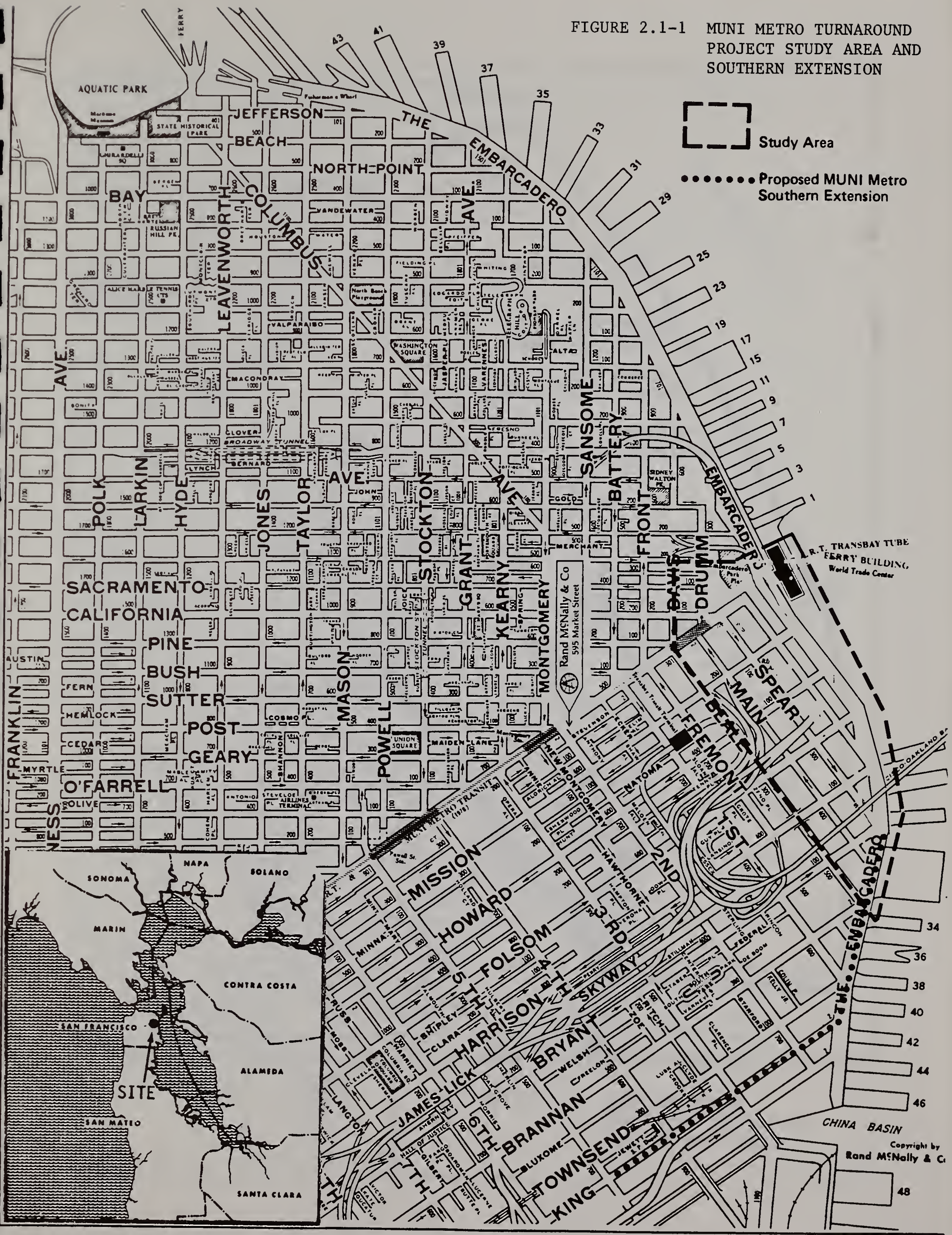
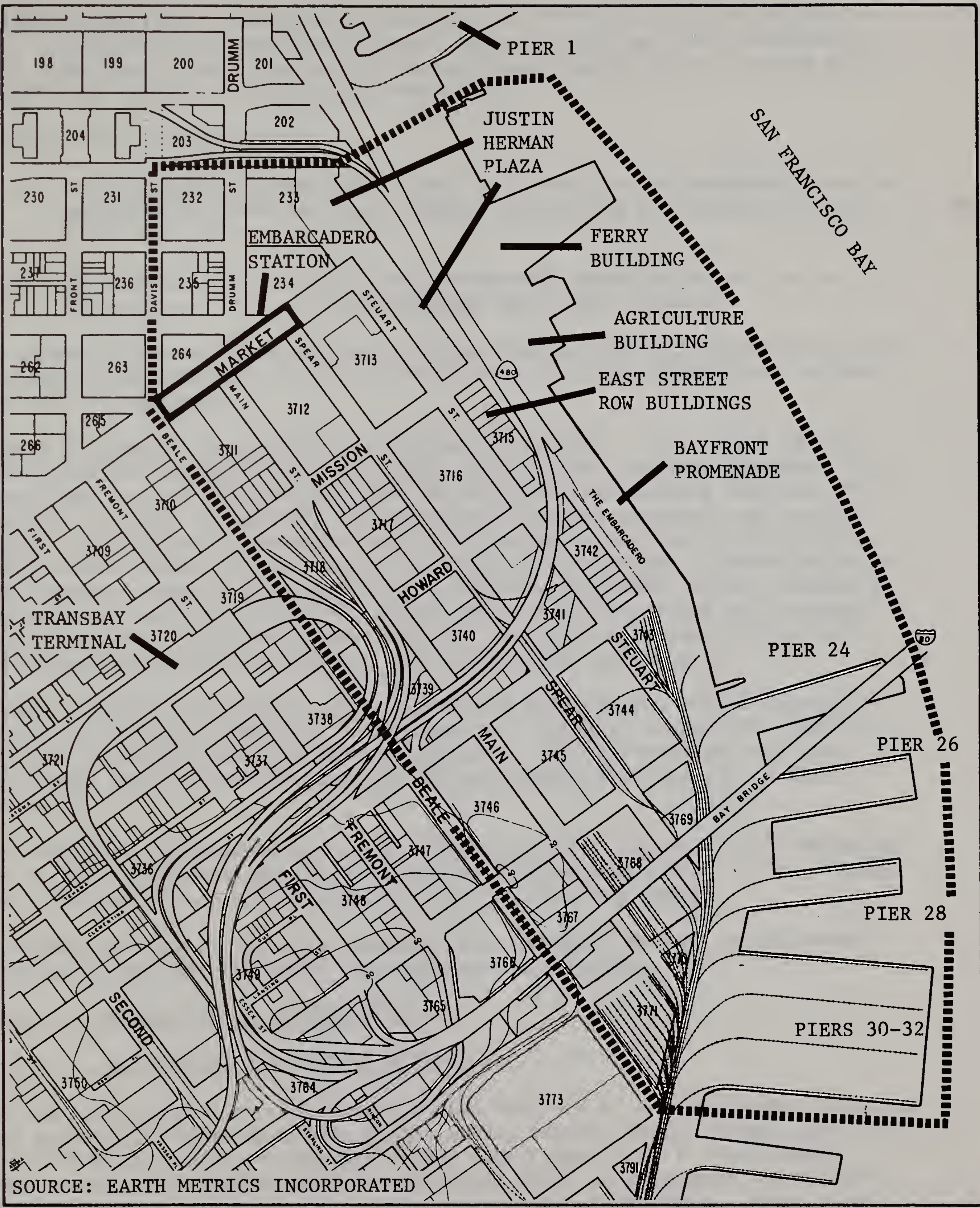


FIGURE 2.1-1 MUNI METRO TURNAROUND PROJECT STUDY AREA AND SOUTHERN EXTENSION

Study Area
Proposed MUNI Metro Southern Extension
AQUATIC PARK
STATE HISTORICAL PARK
JEFFERSON
BEACH
NORTH POINT
BAY
THE EMBARCADERO
COLUMBUS
LEAVENWORTH
RUSSIAN HILL PL.
VANDEWATER
VALPARAISO
WASHINGTON SQUARE
North Beach Playground
MACONDRAY
BROADWAY TUNNEL
LOVER
BERNARD
LYNCH
JOHN
FRESNO
ALTA
SANSOME
BATTERY
SIDNEY WALTON PL.
FRONT
GOLD
MERCHANT
DAVIS
DRUMM
Embarcadero Park Pla.
R.T. TRANSBAY TUBE
FERRY BUILDING
World Trade Center
POLK
LARKIN
HYDE
JONES
TAYLOR
AVE
STOCKTON
GRANT
KEARNY
MONTGOMERY
Rand McNally & Co 595 Market Street
SACRAMENTO
CALIFORNIA
PINE
BUSH
SUTTER
POST
GEARY
O'FARRELL
AUSTIN
FERN
HEMLOCK
CEDAR
MYRTLE
OLIVE
FRANKLIN
NESS
MASON
POWELL
STOCKTON ST. TUNNEL
UNION SQUARE
MAIDEN LANE
COSMO PL.
AIRLINES TERMINAL
MUNI METRO TRANSIT (1978)
Powell St. Sta.
NEW MONTGOMERY
STEVENSON
ECKER
ANTHONY
JESSIE
ANNIE
NATOMA
HAWTHORNE
2ND
1ST
FREMONT
BEALE
MAIN
SPEAR
MISSION
HOWARD
FOLSOM
MINNA
3RD
4TH
5TH
6TH
7TH
HARRISON
SKYWAY
BRYANT
BRANNAN
TOWNSEND
KING
JAMES LICK
CLARA
SHIPLEY
RUSS
MOSS
LANGTON
WELSH
ZOE
RITCH
HALL OF JUSTICE
BLUXOME
JEWETT
GILBERT
BUTTE
LUCERNE
HARRIET
CLEVELAND
COLUMBIA SQ.
STILLMAN
TABER
SOUTH PARK
VARNEY
CLARENCE
STANFORD
DE BOOM
FEDERAL
RINCON
STERLING
HAWES
COLIN P.
KELLY
THE EMBARCADERO
SF-OAKLAND BAY BRIDGE
CHINA BASIN
Copyright by Rand McNally & Co
43
41
39
37
35
33
31
29
25
23
19
17
15
11
9
7
5
3
1
34
36
38
40
42
44
46
48
SONOMA
NAPA
SOLANO
MARIN
CONTRA COSTA
SAN FRANCISCO
ALAMEDA
SITE
SAN MATEO
SANTA CLARA


PIER 1
JUSTIN HERMAN PLAZA
SAN FRANCISCO BAY
EMBARCADERO STATION
FERRY BUILDING
AGRICULTURE BUILDING
EAST STREET ROW BUILDINGS
BAYFRONT PROMENADE
TRANSBAY TERMINAL
PIER 24
PIER 26
PIER 28
PIERS 30-32
MARKET
MISSION ST.
HOWARD
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
SECOND
DRUMM
DAVIS ST
FRONT
THE EMBARCADERO
BAY BRIDGE
198
199
200
201
202
203
204
230
231
232
233
234
235
236
237
262
263
264
265
266
3709
3710
3711
3712
3713
3715
3716
3717
3718
3719
3720
3721
3736
3737
3738
3739
3740
3741
3742
3743
3744
3745
3746
3747
3748
3749
3750
3764
3765
3766
3767
3768
3769
3771
3773
3791
480
80

SOURCE: EARTH METRICS INCORPORATED

N

SCALE

NO SCALE

FIGURE 2.1-2 ENLARGEMENT OF MUNI METRO TURNAROUND PROJECT STUDY AREA

Operations Studies. Subsequent to the March 5, 1986 scoping meeting, studies were conducted to determine the economic justification for the preliminary City requirements and to determine the operating feasibility of various track layouts and reported in Reference Document No. 1.

These studies concluded that:

1. Additional underground facilities for storage and maintenance cannot be economically justified when compared with moving the vehicles to the Green Light Rail Center.

2. It is feasible to locate a stub turnaround operation on the surface in the median of the proposed realigned Embarcadero Parkway.

As a result of these findings, the previous four underground alternatives were set aside, and a new set of simplified alternatives were investigated to meet the City's objectives.

Subsequent Scoping Meeting held on September 22, 1987. As a result of the above studies, completely new and simplified alternatives were developed. Of these, two "build" alternatives were selected for this scoping process. They represent a range in environmental impacts, operating expenses, and capital costs. The Surface Alternative consists of a tunnel section to minimize the construction impacts on the streets and plaza above and BART tunnels below, a cut and cover construction section to bring the main tracks to the surface as quickly as possible to minimize capital costs, and a two track stub turnback on the surface in The Embarcadero median. This is the minimum capital cost alternative that meets all of the City's operating requirements.

A second "build" alternative, the Underground Alternative, was developed to locate the turnback operation underground and to bring the mainline tracks to the surface in the median of The Embarcadero. This alternative requires additional capital cost to construct an underground facility for turnback operation.

The MUNI Metro Turnaround Project EIS Scoping Report (January, 1988) Reference No. 4 was prepared to summarize the commentary received either at the scoping session or by letter and to respond to the concerns expressed.

As stated previously, the EIS examines these concerns as part of the overall process to evaluate and select the preferred alternative.

2.3 DEFINITION OF ALTERNATIVES

2.3.1 ALTERNATIVE 1 - SURFACE ALTERNATIVE

The Surface Alternative would begin at the east end of the Embarcadero Station and proceed northeast in a twin tunnel subway beneath Market Street, generally over the BART tunnels, to Steuart Street (see Figure 2.3-1). The tunnels would curve to the south under Justin Herman Plaza to a proposed ventilation structure under the Embarcadero Roadway and clear of the Plaza. This is an underground structure with an exposed grating for the intake or exhaust of air. The same structure will be constructed for both Alternative 1

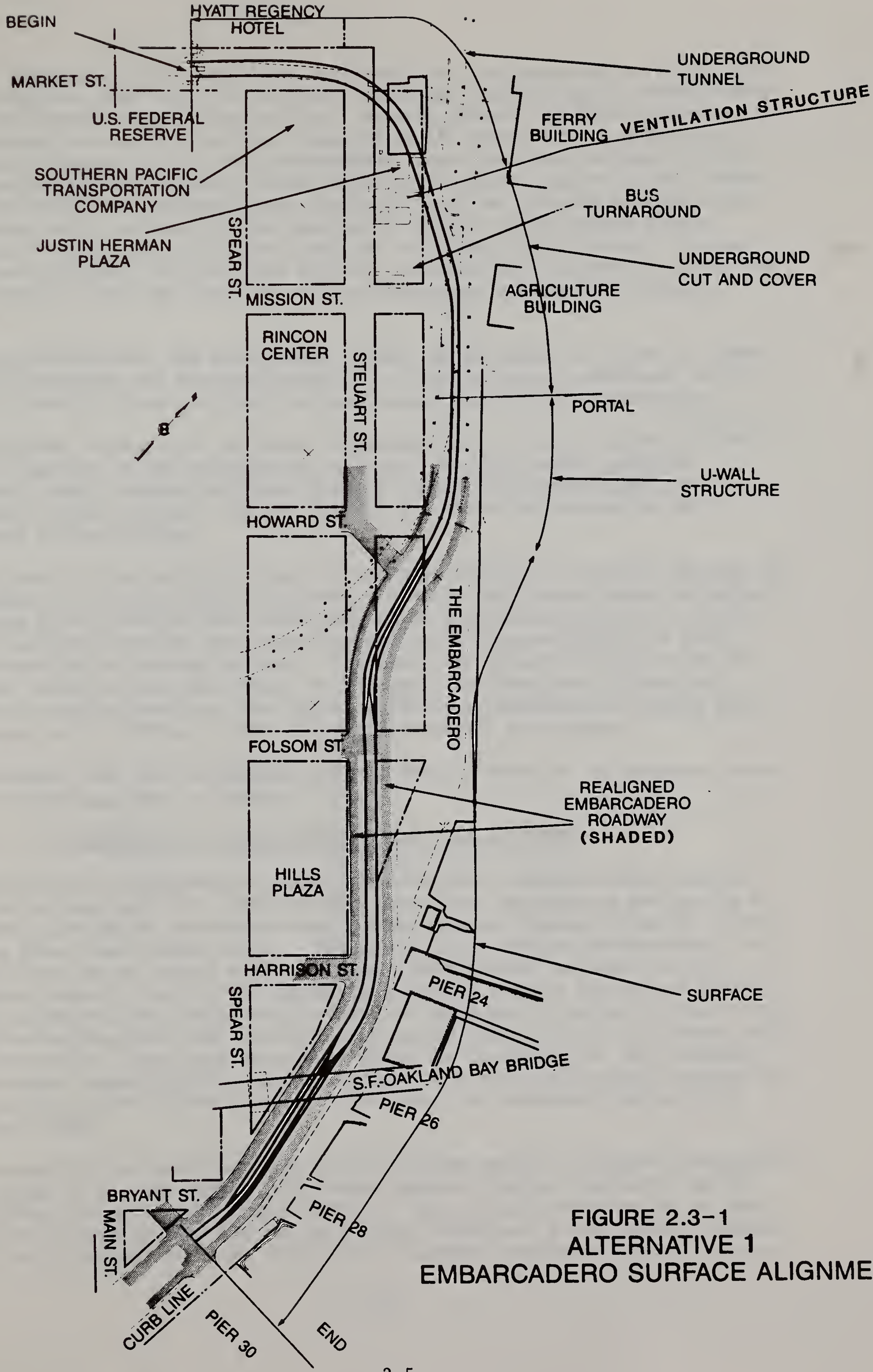

BEGIN
HYATT REGENCY HOTEL
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
SPEAR ST.
MISSION ST.
RINCON CENTER
STEUART ST.
HOWARD ST.
FOLSOM ST.
HILLS PLAZA
HARRISON ST.
SPEAR ST.
BRYANT ST.
MAIN ST.
CURB LINE
PIER 30
END
PIER 28
PIER 26
S.F.-OAKLAND BAY BRIDGE
PIER 24
THE EMBARCADERO
UNDERGROUND TUNNEL
FERRY BUILDING
VENTILATION STRUCTURE
BUS TURNAROUND
UNDERGROUND CUT AND COVER
AGRICULTURE BUILDING
PORTAL
U-WALL STRUCTURE
REALIGNED EMBARCADERO ROADWAY (SHADED)
SURFACE

FIGURE 2.3-1
ALTERNATIVE 1
EMBARCADERO SURFACE ALIGNMENT

and 2. From this point the route would continue southeasterly in subway open cut structure, then curve to the right under the elevated Embarcadero Freeway near the Mission Street intersection. Between Mission and Howard Streets, the route would ascend to a surface alignment in the median of The Embarcadero Parkway at Howard Street. The surface route would continue southeast in The Embarcadero median through reverse curves to the north line of Folsom Street. A center track for turning a four-car train would be provided in this block. The route would continue in The Embarcadero median across Folsom Street, Harrison Street, and to the north side of realigned Bryant Street. In the last block the main tracks would spread to accommodate two center tracks, one for turning a four car train and one for temporary holding of a disabled train.

In this alternative, the Embarcadero Parkway median would be closed to cross traffic at Howard and Harrison streets. At Folsom Street, eastbound traffic would be able to turn left onto the northbound lanes of The Embarcadero.

The mainline tracks would be spaced to accommodate a future center platform station between Folsom and Harrison streets. A future Metro southern extension would connect with the turnback tracks at the north side of realigned Bryant Street. Neither the future station nor extension are included in this project.

Operationally, the existing train control system would be extended through the new subway to the new portal near Howard Street. All trains would be manually operated on the surface with train separation controlled by wayside signals. Track switches would be power operated and remotely controlled by a local supervisor and/or central control. The center track near Folsom Street and the two middle tracks near Bryant Street would be signalled to turn back trains in regular service. The existing layout at Embarcadero Station would be signalled to turnback trains under non-scheduled conditions.

The proposed year 2007 operating plan for this alternative is described under Future Operating Plan in paragraph 1.2.1.

2.3.2 ALTERNATIVE 2 - EMBARCADERO UNDERGROUND ALIGNMENT

The Embarcadero Underground Alternative would have a subway tunnel section similar to Alternative 1, from the east end of the Embarcadero Station to a proposed ventilation structure under the Embarcadero Roadway clear of Justin Herman Plaza (see Figure 2.3-2). The route would continue southeasterly in a subway open cut structure under the Embarcadero Freeway adjacent to the westerly property line of The Embarcadero between Mission and Howard Streets. South of Howard, the tracks would spread to accomodate a center turnback track with access from both ends followed by a second center track with access only from the north. The route would then ascend to the median of the realigned Embarcadero Parkway south of Howard Street. One main track would continue on the surface across Folsom Street for 330 feet, for temporary holding of a disabled train.

Operationally, the existing train control system would be extended through the new subway to the new portal near Folsom Street. Surface operation on the tail track would be under manual control. All track switches would be power operated and remotely controlled by a local supervisor and/or central control. Both center pockets would be signalled to turnback trains in regular service.

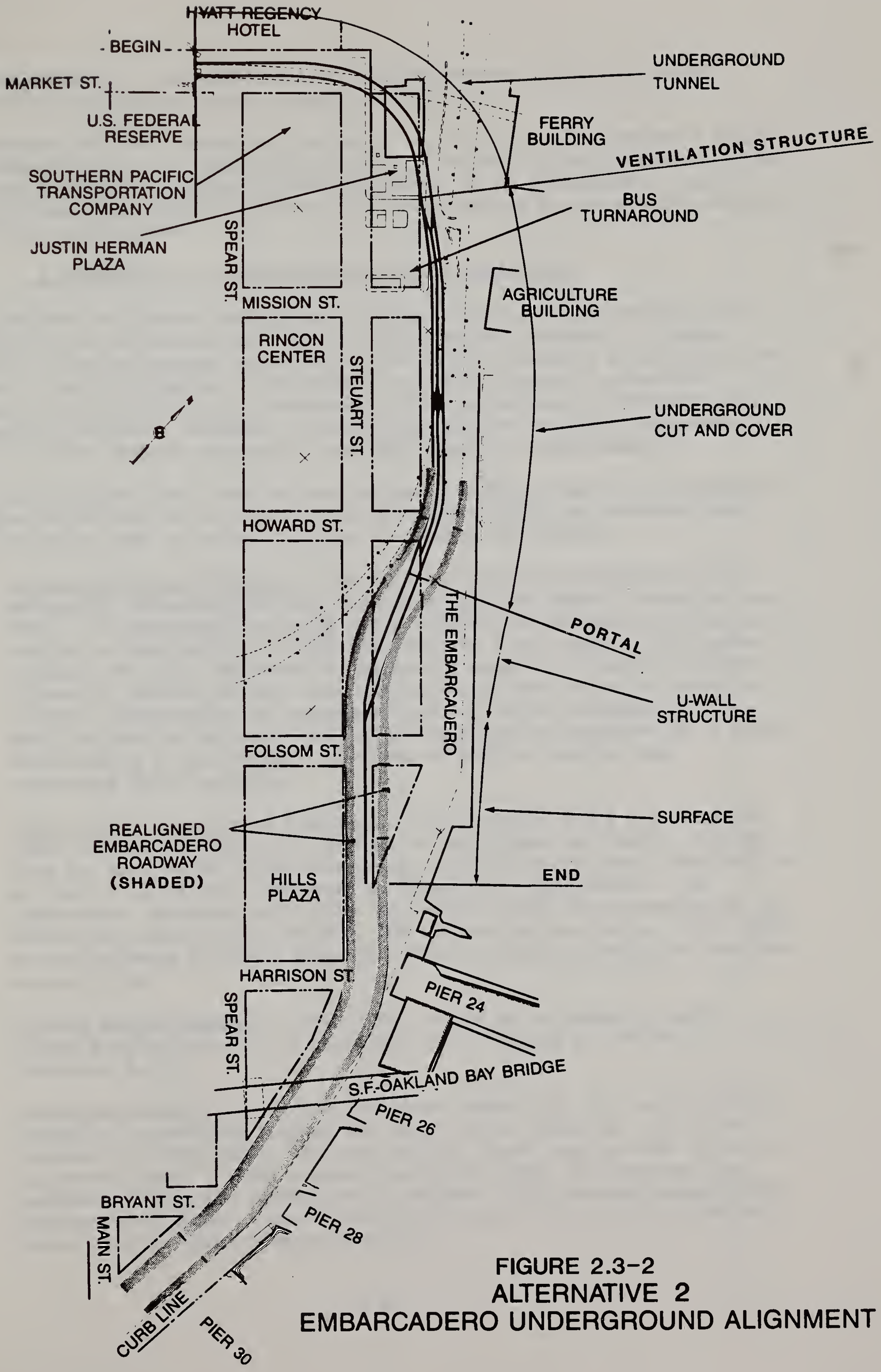

HYATT REGENCY HOTEL
BEGIN
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
SPEAR ST.
MISSION ST.
RINCON CENTER
STEUART ST.
HOWARD ST.
FOLSOM ST.
HILLS PLAZA
HARRISON ST.
SPEAR ST.
BRYANT ST.
MAIN ST.
CURB LINE
PIER 30
PIER 28
PIER 26
S.F.-OAKLAND BAY BRIDGE
PIER 24
REALIGNED EMBARCADERO ROADWAY (SHADED)
THE EMBARCADERO
UNDERGROUND TUNNEL
FERRY BUILDING
VENTILATION STRUCTURE
BUS TURNAROUND
AGRICULTURE BUILDING
UNDERGROUND CUT AND COVER
PORTAL
U-WALL STRUCTURE
SURFACE
END

FIGURE 2.3-2
ALTERNATIVE 2
EMBARCADERO UNDERGROUND ALIGNMENT

As in Alternative 1, the existing layout at Embarcadero Station would be signalled to turnback under non-scheduled conditions.

The proposed year 2007 operating plan would be similar to Alternative 1 except all J trains (6 per peak hour) and all K, L, M trains (12 per peak hour) would be turned on the two underground pocket tracks. As in Alternative 1, all N trains (12 per peak hour) could serve the future Folsom Street station and the Metro southern extension.

2.3.3 ALTERNATIVE 3 - TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) Alternative would provide a low cost approach to addressing MUNI Metro transportation problems. It also provides a baseline against which all of the major investment alternatives are measured. The TSM Alternative represents the best that can be done for mobility with the existing infrastructure, that is, without construction of a new transit guideway. Generally, the TSM Alternative emphasizes upgrades in transit service through operational and small physical improvements.

The TSM alternative would include the following modifications to the existing train control system and to the light rail vehicles (LRV) to increase speed and reliability, and to reduce the time to reverse the trains:

1. Vehicle Brake Modification. The existing LRV brake system does not adequately compensate for the effects of profile grade or slope of the track. If adequate braking is not provided, the emergency brakes are applied automatically to bring the train to a full stop. This system provides for safe operation of the train; however, it encourages the drivers to operate at less than the indicated safe speed to avoid the automatic application of emergency brakes. Three alternative modifications to the brake system are proposed in Reference No. 7 which would ensure proper brake application or profile grades, thus increasing Metro capacity.

2. Train-line the Reversing Functions. The existing light rail vehicles (LRV) must be individually reversed by the driver who removes his key from one end, walks to the other end, and inserts his key. Each LRV in a train of up to four LRVs must be reversed in this manner. The improvement proposed would allow the entire train to be reversed by the removal and insertion of keys at the end cabs of the train. This would be accomplished by installing new control circuits through the couplers between LRVs.

3. Wayside Signal Changes. Train speeds would be increased by minor wiring modifications at 23 locations in the subway as defined in Reference No. 7.

4. Additional Speed Code. Three safe speed codes (10, 27, and 50 mph) are presently transmitted through the track to the vehicles. The code received is displayed in the cab, and the driver may operate up to the indicated limit. If the driver exceeds the limit plus two mph, the emergency brakes are automatically applied. The proposed change would increase the number of speed codes from three to four, thus allowing a higher average speed between stations.

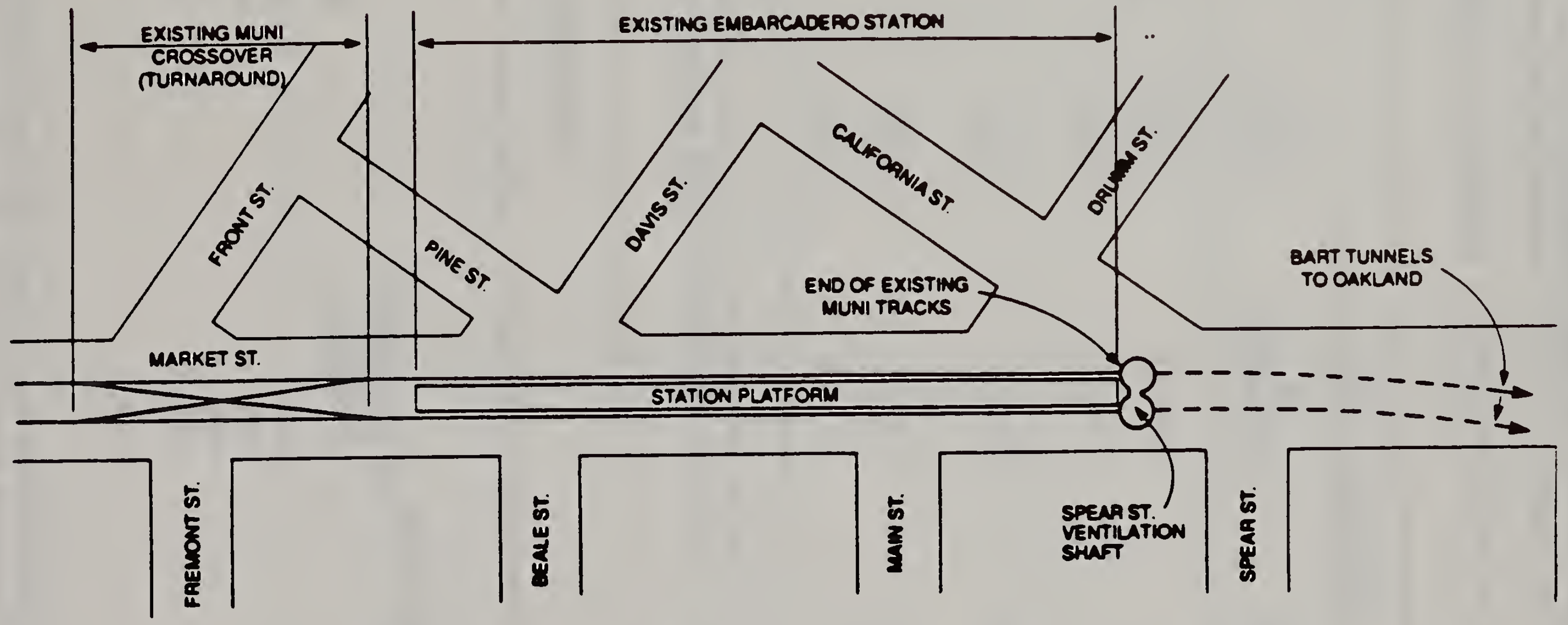
2.3.4 ALTERNATIVE 4 - NO-ACTION ALTERNATIVE

The No-action Alternative is based on no new MUNI facilities nor changes to Metro operation.

As shown in Figure 2.3-3, the existing MUNI Metro Market Street subway line ends at the east end of the Embarcadero Station. BART, which is located below the MUNI level, continues easterly under the Bay to Oakland and other East Bay cities.

The current operation of 20 to 22 trains per hour through Embarcadero Station and the ultimate capacity of approximately 25 trains per hour is discussed in Paragraph 1.1.4.

The inability of the existing facility to handle the proposed operating plan of 30 trains per hour is discussed in Paragraph 1.2.1.


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
STATION PLATFORM
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.

SOURCE: BECHTEL NATIONAL, INC.

N

SCALE
NO SCALE

FIGURE 2.3-3 ALTERNATIVE 3 AND 4 TRANSPORTATION SYSTEMS MANAGEMENT AND NO ACTION

2.4 CAPITAL COST ESTIMATES

2.4.1 GENERAL

Capital Cost Estimates based on conceptual designs were prepared for the purpose of comparing the alternatives defined in this document. These costs, based on prices from Second Quarter 1988, are summarized in Table 2.4-1.

TABLE 2.4-1. PROJECT COST SUMMARY IN 1988 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
Fixed Facilities	60.793	83.262	-	-
Rolling Stock (Turnaround)	9.100	6.500	-	-
TSM (a)	1.500	1.500	1.500	-
Miscellaneous Costs	0.402	0.621	-	-
TOTAL	71.795	91.883	1.500	0

(a) TSM improvements need to be implemented as part of Alternatives 1 and 2 in order to realize full operational benefits of the new turnback facility.

2.4.2 FIXED FACILITIES

The major types of construction for the Build Alternatives are summarized as follows:

	ROUTE FEET	
CONSTRUCTION	ALTERNATIVE NO. 1 SURFACE	ALTERNATIVE NO. 2 UNDERGROUND
Subway - Twin Tunnel	840	840
Subway - Open Cut	543	1,058
U-Wall	382	386
Surface	2,236	526
TOTAL	4,001	2,810

Capital cost estimates for the Surface and Underground Alternatives are based on the conceptual design defined in the Final Engineering Report (Reference Document No. 2). The basis of the estimate, and the estimate summary sheets, are contained in the Conceptual Cost Estimate (Reference Document No. 6). A summary of the current costs for these two alternatives is contained in Table 2.4-2.

TABLE 2.4-2. FIXED FACILITY COST ESTIMATE SUMMARY FOR SURFACE AND UNDERGROUND ALTERNATIVES (a)

ITEM	SECOND QUARTER 1988 ($ MILLIONS) ALTERNATIVE NO. 1 SURFACE	 ALTERNATIVE NO. 2 UNDERGROUND
Tunnel	19.585	19.585
Cut and Cover	12.812	26.475
Freeway Underpinning	2.788	6.405
Systemwide:		
- Track	2.065	1.732
- Mechanical	0.637	0.758
- Electrical	5.716	4.848
Special Services	0.450	0.550
TOTAL CONSTRUCTION	44.053	60.335
Design and Construction Management (15%)	6.608	9.050
Subtotal	50.661	69.385
Contingency (20%)	10.132	13.887
PROJECT TOTAL	60.793 (6.140) (b)	83.262 (8.409)

(a) Major exclusions from the Cost Estimate Summary are:

- Handling and disposal of toxic materials
- All new Embarcadero Parkway work including preparation of MUNI track subgrade, storm drain system, landscaping, traffic signals, lighting and utility work.
- Private property acquisition (to be acquired by Parkway Project).
- All costs to remove, relocate, or reconstruct the San Francisco Belt Railroad.
- Project insurance coverage of all parties.
- Special environmental costs such as the excavation of historic artifacts.
- All costs incurred by the City and other agencies including POSF, BART, California PUC, UMTA, and MTC.
- Final Engineering and related PUC administrative costs.
- All costs for a future Metro southern extension and passenger station at Folsom Street.
- Financing and interest during construction.

(b) Costs in ( ) are annualized costs over the 50 year service life based on a 0.101 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning" dated September 1986.

TABLE 2.4-4. FIXED FACILITY BUDGET ESTIMATE FOR SURFACE AND UNDERGROUND ALTERNATIVES (MILLIONS OF DOLLARS)

ITEM	ALTERNATIVE NO. 1 SURFACE	ALTERNATIVE NO. 2 UNDERGROUND
Project Total (1988)	$60.793	$83.262
Escalation to 1993	20.898	28.856
Budget Total	81.691	112.118

Budget estimates for rolling stock were not prepared due to uncertainties in the proposed purchase dates.

2.4.5 TSM COST ESTIMATE

Additional Operations Studies - Task No. 10, Train Control and Vehicle Improvements (Reference Document No. 7) identifies and discusses a set of Transportation System Management (TSM) improvements which are included in Alternative No. 3 in this document.

The Components and Cost Estimate for the TSM alternative are summarized in Table 2.4-5.

TABLE 2.4-5. TSM SUMMARY - ALTERNATIVE NO. 3

IMPROVEMENT	COST
1. Modify the service brake rate circuit to compensate for profile grades.	$ 260,000
2. Train-line the reversing function for all cars in a train set to speed up turnaround time.	$ 500,000
3. Revise the speed profiles to increase speed at 23 locations.	$ 23,000
4. Add one new speed code to increase overall speed.	$ 280,000
5. Contingency	$ 437,000
TOTAL	$1,500,000

The total cost of the TSM improvements including contingency would be $1.5 million (1988 dollars). The annualized cost over a 25 year service life would be $0.16 million based on a 0.110 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning," dated September, 1986.

2.4.3 ROLLING STOCK

Capital Cost Quantities and Estimates for additional light rail vehicles (LRVs) are taken from the Operations Summary Report (Reference Document No. 1). A summary of these costs is shown in Table 2.4-3.

TABLE 2.4-3. ROLLING STOCK COST ESTIMATE SUMMARY FOR SURFACE AND UNDERGROUND ALTERNATIVES

	ALTERNATIVE NO. 1 SURFACE		ALTERNATIVE NO. 2 UNDERGROUND	
REQUIREMENT	LRVs	$MILLIONS	LRVs	$MILLIONS
Turnaround	7	$9.100 (1.00)	5	$6.500 (0.72)
20 Year Growth	19	24.700 (2.72)	19	24.700 (2.72)
TOTAL	26	33.800 (3.72)	24	31.200 (3.43)

NOTES:

(a) The Fleet/Peak vehicle ratio is 120 percent based on current MUNI spare ratio.

(b) Unit price of LRVs is $1.3 million based on San Francisco Municipal Railway Capital Improvement Program, 1986-1991, p. 74.

(c) Costs in ( ) are annualized costs over the 25 year service life based on a 0.110 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning" dated September 1986.

2.4.4 BUDGET ESTIMATE

Fixed facilities budget estimates for the Surface and Underground Alternatives were prepared based on current project costs plus escalation in accordance with an assumed construction schedule as follows:

	SCHEDULE	
	Begin	End
Phase I - Conceptual Design and EIS	September 1985	January 1989
Phase II - Final Design	June 1989	December 1990
Phase III - Construction	January 1991	December 1993

An average escalation of 7.2 percent per year was assumed for the calculation, based on the 1977 to 1987 average of the Engineering News Record Construction Cost Index. Cash flow plans are included in Reference Document No. 6.

Budget estimates are shown in Table 2.4-4.

2.4.6 MISCELLANEOUS CAPITAL COSTS

The City will incur other costs during the implementation of this project which must be considered in the EIS process. Some of these costs can be quantified, but others can only be identified as potential costs to be quantified during final design or even construction.

QUANTIFIED MISCELLANEOUS COSTS

1. Costs to reroute MUNI trolley bus lines to compensate for the loss of a portion of the existing turnaround at Steuart and Mission Streets. MUNI estimates this cost at $250,000.

2. Loss of parking revenue for the Port of San Francisco during the construction period. The cost of $152,000 for the Surface Alternative and $371,300 for the Underground Alternative is developed and discussed in paragraph 4.3.2.1.

POTENTIAL MISCELLANEOUS COSTS

1. Costs to meet the requirements of CCSF Ordinance No. 443-86, "Analyzing Soil for Hazardous Waste."

2. Costs associated with the excavation of historic artifacts found during the tunneling and open cut construction operations.

3. Additional BART costs to maintain service during the MUNI tunneling operation above the existing BART tunnels.

4. Additional cost due to construction conflicts between this project and other City projects such as the Embarcadero Parkway, MUNI Metro Extension, and MUNI F-line Extension.

2.5 OPERATIONS AND MAINTENANCE EXPENSE

2.5.1 GENERAL

Annual additional operating and maintenance (O&M) expenses were calculated based on the operating statistics calculated in Operating Plan A in Reference Document No. 1, and the variable cost rates for fiscal year 1986/1987 shown in MUNI's Standard Services Costing Worksheets for fiscal year 1986/1987 dated August 21, 1986. These additional expenses include only the costs associated with the owning, operating, and maintaining a vehicle; and the portion of the maintenance of the fixed facility that is a function of vehicle miles. It does not include the fixed expenses that are independent of the number of and operation of vehicles.

Annual additional O&M expenses were calculated for the projected 20 year growth of the existing MUNI Metro system and for the Turnaround Project alternatives, for the purpose of comparing the financial impact of these alternatives.

These expenses are presented in Table 2.5-1.

TABLE 2.5-1. ANNUAL ADDITIONAL OPERATIONS AND MAINTENANCE EXPENSES, 1987 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
20 Year Growth	2.348	2.348	2.348	2.348
Turnaround	1.320	0.873	-	-
TOTAL	3.668	3.221	2.348	2.348

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The affected environment related to the MUNI Metro Turnaround Project is described herein. Although most of the following sections describe the existing setting for the area within the boundary, occasional reference to the blocks immediately adjacent to the project boundary and to particular transportation plans related to the Turnaround Project, but extending outside the project boundary, are cited.

3.1 LAND USE, PLANNING AND PUBLIC POLICY

3.1.1 INTRODUCTION

This chapter discusses land use, planning and applicable public policies pertaining to the proposed project and the study area. This discussion is presented in two sections. Existing land uses, current planning and development trends are discussed in the first section. This is followed by a discussion of applicable Federal, State and local plans and policies of public agencies and private companies which have regulations, jurisdictions, guidelines or plans related to the study area and the proposed project. References to the study area generally represent the larger area of secondary analysis related to the proposed project. Since land use issues for projects such as the MUNI Metro Turnaround are generally in close proximity to the facility, a smaller project area is identified within the larger study area (see Figure 3.1-1). Land use issues within the project area are generally discussed and later (Chapter 4) examined in somewhat more detail than the larger study area.

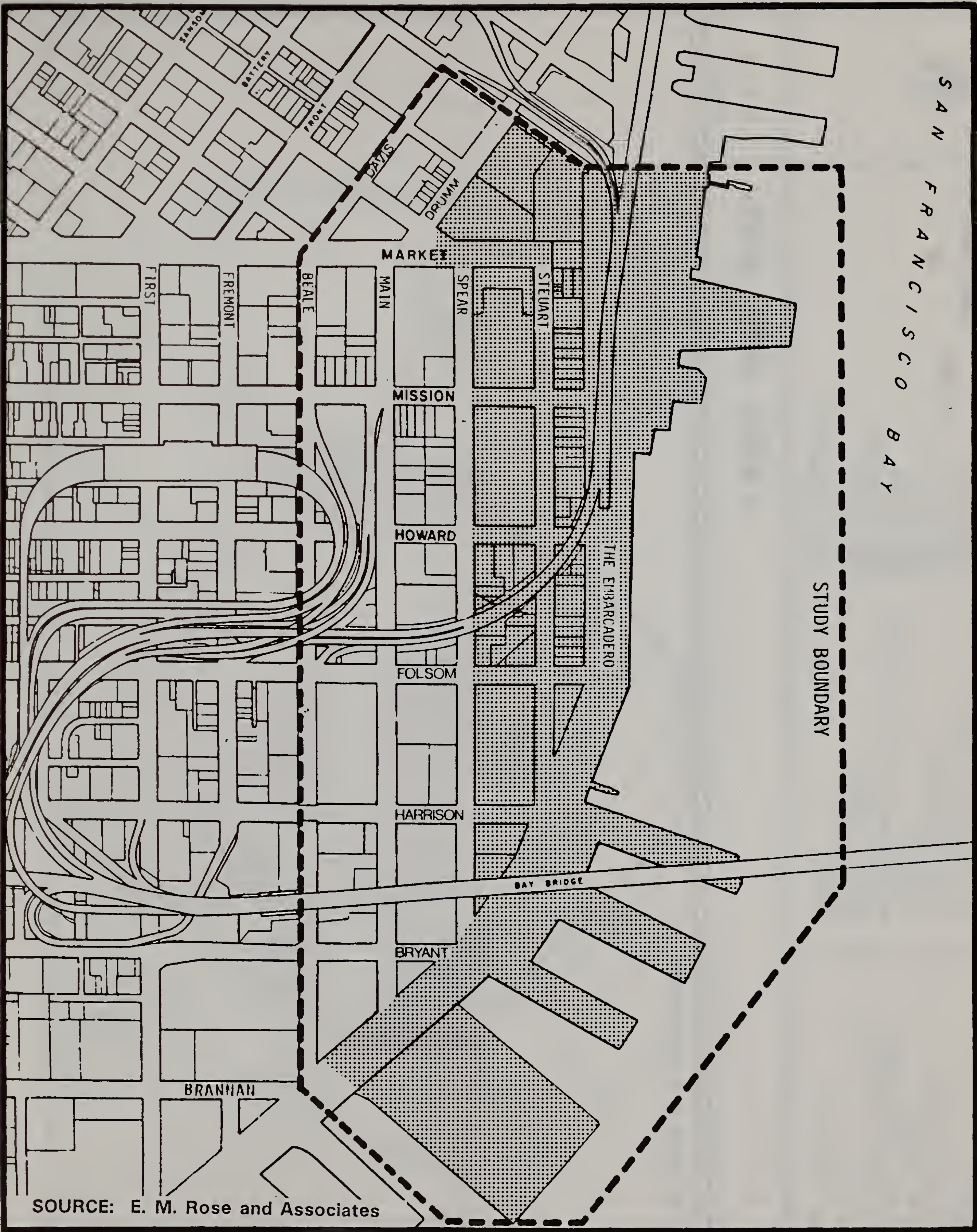
OVERVIEW

The land use study area for the Turnaround Project extends from Clay on the north, Davis and Beale on the west to the terminus of Beale at the Brannan-Embarcadero intersection. The eastern (bayside) boundary extends from Clay to Brannan and Beale and includes all of the Port of San Francisco facilities from the Ferry Building through Pier 30/32. The project boundary includes portions of several defined subareas including Embarcadero Center, the Ferry Building Area, Rincon Point-South Beach redevelopment area, Rincon Hill and pier facilities.

Land uses within the study boundary are discussed in two areas. They are the north of Market area and south of Market area. Market Street is an identifiable subarea boundary because the density of development north of Market is distinctive from the general south of Market area. The south of Market area obtains a sense of cohesion from the geographical limits and current development trends. Most of the land uses within the study area are located south of Market Street (see Figure 3.1-2). Therefore, for clarity of discussion purposes, Justin Herman Plaza and the Ferry Building complex are included in the south of Market discussion.

In addition to the Justin Herman Plaza and the Ferry Building complex, the south of Market study area encompasses 21 blocks, the Bayfront Promenade and Piers 22-1/2, 24, 26, 28, and 30/32. Zoning in this portion of the study area ranges from industrial districts at the southern end in the vicinity of Pier 30/32 to the commercial districts in the vicinity of the Ferry Building (see Figure 3.1-3). South of Market height and bulk requirements range from 40 feet (40-X) for the Piers 26, 28 and 30/32 to 400 feet (400-S) at Beale and Market Streets (see Figure 3.1-4).

The north of Market study area includes five city blocks. Most of the project area north of Market Street is zoned for commercial uses (see Figure 3.1-3). Height and bulk designations range from 84 feet (84-X and 84-J) at and near the Ferry Building to 400 feet (400-S) in the intensively developed blocks at Davis and Market Streets (see Figure 3.1-4).


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
HOWARD
FOLSOM
HARRISON
BAY BRIDGE
BRYANT
BRANNAN
THE EMBARCADERO
STUDY BOUNDARY
SAN FRANCISCO BAY

SOURCE: E. M. Rose and Associates

LAND USE STUDY AREA

FIGURE 3.1-1

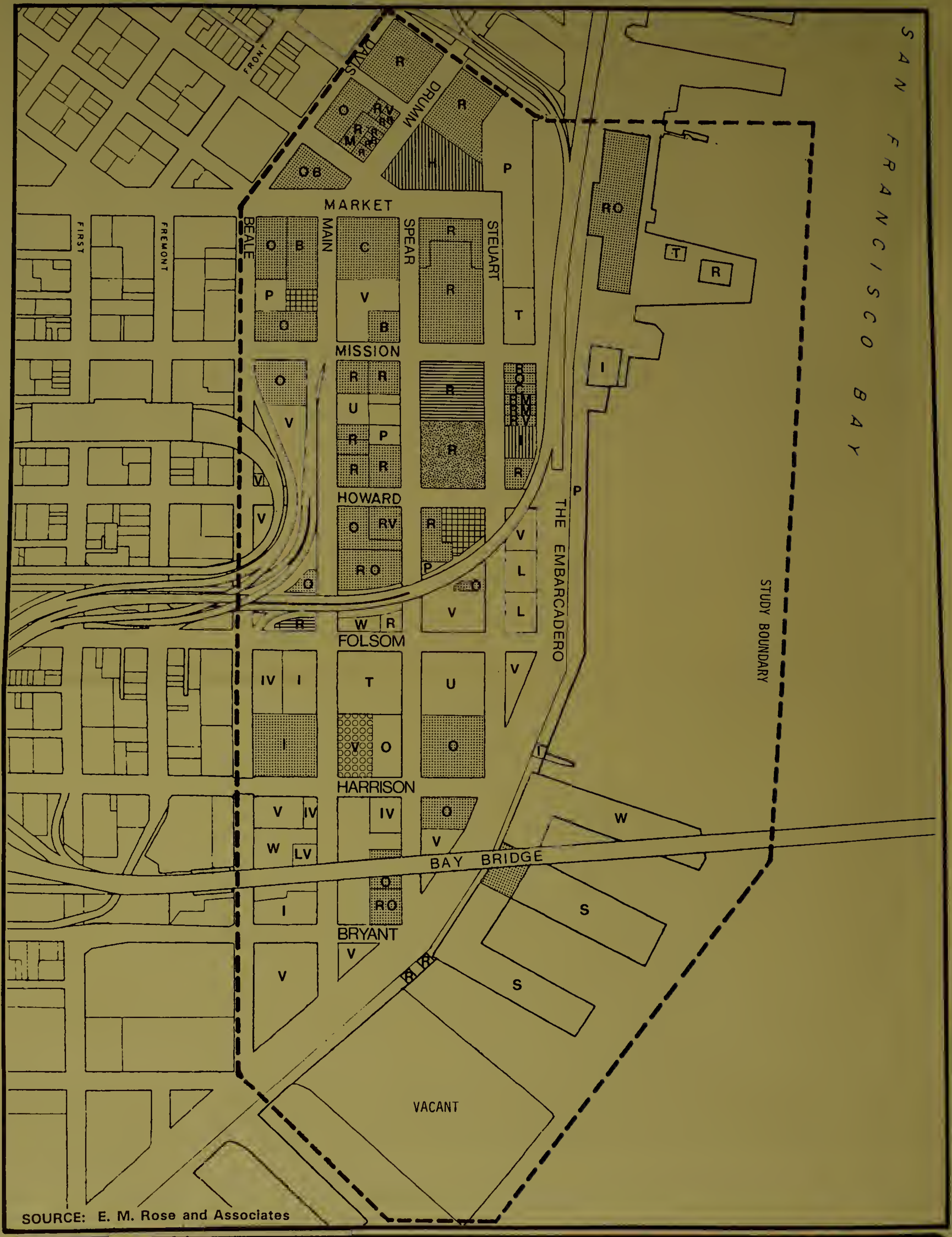
▨ PROJECT AREA

– – – STUDY AREA

800 FEET

FIGURE 3.1-2

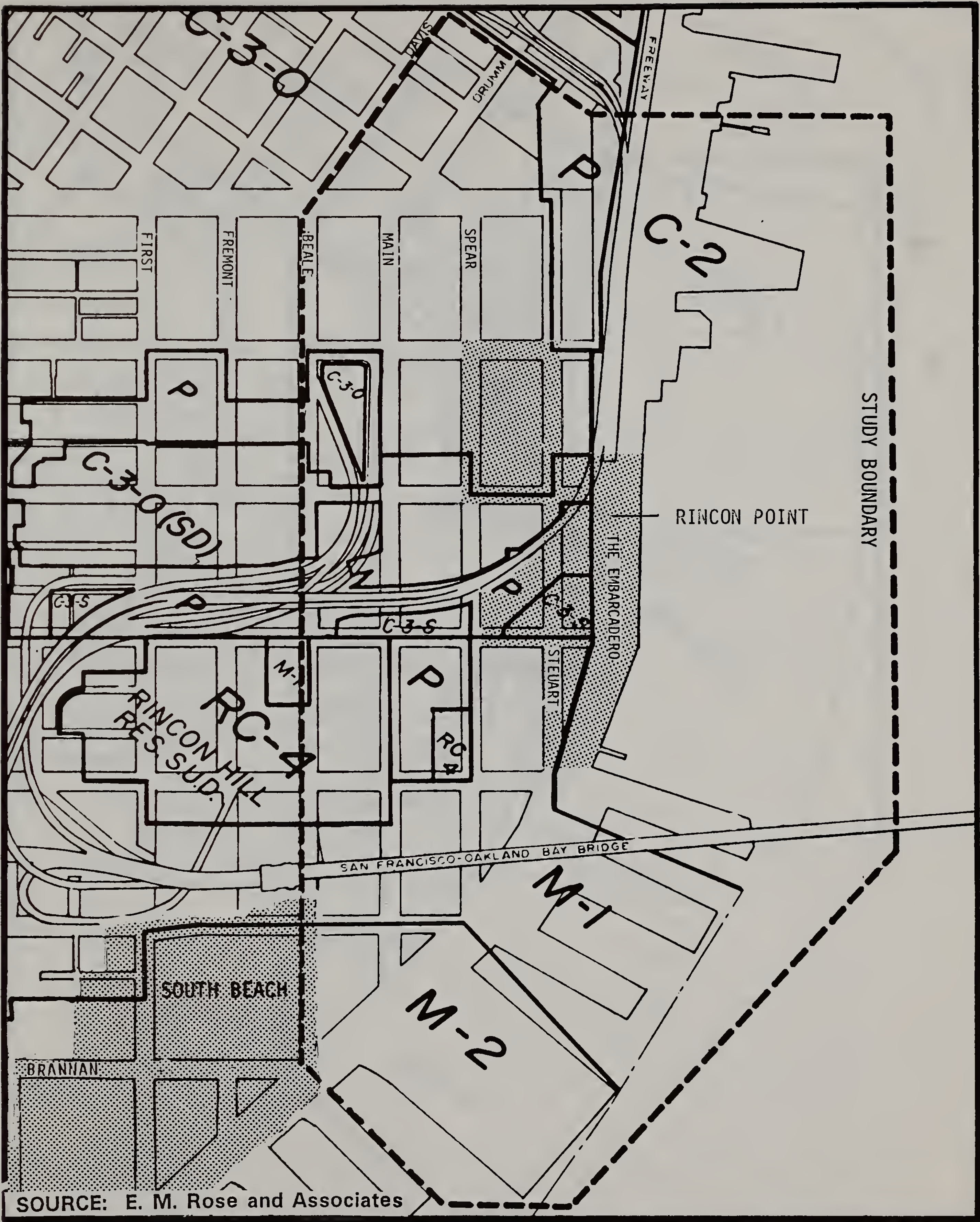
LAND USE MAP


SAN FRANCISCO BAY
STUDY BOUNDARY
THE EMBARCADERO
MARKET
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
FRONT
DAVIS
DRUMM
MISSION
HOWARD
FOLSOM
HARRISON
BRYANT
BAY BRIDGE
VACANT
500 FEET

SOURCE: E. M. Rose and Associates

GROUND FLOOR USE
- O OFFICE
- W WHOLESALE / WAREHOUSE
- R RETAIL / RESTAURANT
- P PARK / PLAZA
- F FURNITURE STORE
- B BANK
- T TRANSIT
- H HOTEL
- I INSTITUTIONAL
- M MEDICAL CLINIC
- V VACANT LAND / SURFACE PARKING
- C CULTURAL
- L LIGHT INDUSTRIAL
- U UNDER CONSTRUCTION
- S SHIP SERVICES / REPAIR

UPPER FLOOR USE
- ▦ OFFICE
- ▩ RESIDENTIAL
- ○ VACANT
- ▥ HOTEL
- ▦ PARKING STRUCTURE
- ▤ RETAIL


C-3-O
DAVIS
DRUMM
FREEWAY
P
C-2
FIRST
FREMONT
BEALE
MAIN
SPEAR
P
C-3-O
STUDY BOUNDARY
C-3-O (SD)
RINCON POINT
THE EMBARCADERO
C-3-S
P
P
C-3-S
C-3-S
M-1
RC-4
RINCON HILL RES. S.U.D.
P
RC-4
STEUART
SAN FRANCISCO-OAKLAND BAY BRIDGE
M-1
SOUTH BEACH
M-2
BRANNAN

SOURCE: E. M. Rose and Associates

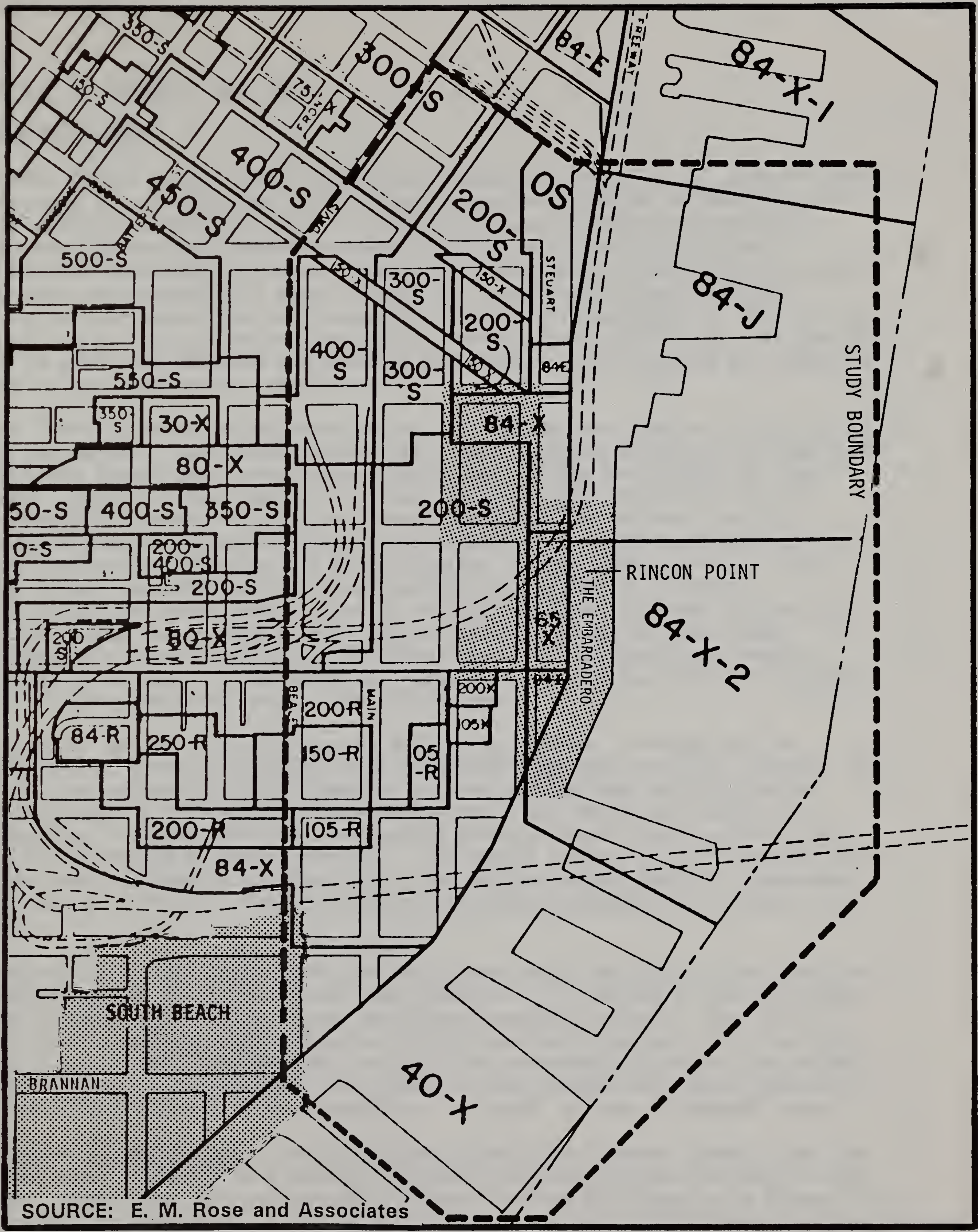
ZONING MAP

FIGURE 3.1-3

C-2 , C-3-0	COMMERCIAL
M-1 , M-2	INDUSTRIAL
P	PUBLIC
RC-4	RESIDENTIAL-COMMERCIAL
▨	S.F.R.A. PROJECT AREAS (DESIGNATED ZONING SUPERSEDED)

SOURCE: CITY & COUNTY OF SAN FRANCISCO

600 FEET


330-S
150-S
75-X
FRONT
300-S
84-E
FREEWAY
84-X-1
400-S
450-S
BATTERY
DAVIS
OS
200-S
500-S
150-X
300-S
150-X
200-S
STEUART
84-J
400-S
300-S
150-X
84-E
STUDY BOUNDARY
550-S
350-S
30-X
84-X
80-X
50-S
400-S
350-S
200-S
0-S
200-400-S
200-S
RINCON POINT
THE EMBARCADERO
84-X-2
200-S
80-X
65-X
BEALE
MAIN
200-R
200-X
84-E
105-X
84-R
250-R
150-R
OS-R
200-R
105-R
84-X
SOUTH BEACH
BRANNAN
40-X

SOURCE: E. M. Rose and Associates

FIGURE 3.1-4

HEIGHT AND BULK MAP

OS — OPEN SPACE DISTRICT

00-Z — NUMBERS ARE HEIGHT LIMITS IN FEET
LETTER SYMBOLS REFER TO BULK LIMITS IN CITY PLANNING CODE SEC .270

▨ S.F.R.A. PROJECT AREAS (DESIGNATED HEIGHT AND BULK SUPERSEDED)

SOURCE: CITY & COUNTY OF SAN FRANCISCO

800 FEET

3.1.2 EXISTING LAND USES

SOUTH OF MARKET

Market Street is the break between the regular pattern of small, square blocks arranged in a north/south grid of the northeastern quadrant of the City and the south of Market corridors of long blocks running southwest/northwest. Whereas the north of Market business district is scaled to pedestrian movement, the south of Market blocks have traditionally been oriented to the movement and assembly of goods between the waterfront and rail and road corridors moving across the former Bay flats toward the center of the City and down the Peninsula. Private and public redevelopment efforts over the last 20 to 30 years are changing the south of Market land uses to medium and high-rise office and high density residential.

The Ferry Building is the principal use east of The Embarcadero at the foot of Market Street. The importance of this location places the Ferry Building area in a key transitional area between waterfront, office and industrial land uses. There are four zones in the Ferry Building area which provide the transition from water to the high-rise development to the west. At the water's edge there are three major structures in the Turnaround Project area: the Agriculture Building, the Ferry Building, and the BART platform. The Agriculture Building and the Ferry Building are presently in office, restaurant and retail uses. Much of the BART platform area east of the Ferry Building has been leased by the Port to the Ferry Plaza and the Sinbad Restaurants and to the Golden Gate Ferry Terminal. National Auto Rental leases space north of the Ferry Building. Metered parking areas are adjacent to the Ferry Building east of The Embarcadero.

Inland of the Port facilities, the Embarcadero Freeway overhead and the Embarcadero Roadway at grade level constitute a roadway zone that includes the Belt Line Railway and three lanes of surface parking that are bordered on either side by two to three lanes of roadway. The third zone inland is comprised of a 100 foot band of low-rise and open space uses separating the roadway from the high-rise district. The Justin Herman Plaza is in this third zone north of Market, the East Street Row and the nearby MUNI bus turnaround are south of Market. The high-rise district begins immediately beyond this zone.

Between the Ferry Building and the South Beach area, the Port of San Francisco facilities are in various conditions. Piers 14, 18, 20 and 22 were condemned and demolished as a part of the waterfront Promenade project. Pier 22 1/2, the San Francisco Fireboat Station is an active San Francisco Fire Department facility. Pier 24 is currently utilized for warehouse and storage operations. Piers 26 and 28 are currently utilized for ship service and repair operations. Pier 30-32, although in good condition, is vacant and not in regular usage.

West of The Embarcadero, the block bound by Mission, Howard, Steuart, and The Embarcadero consists of a number of historic buildings called the East Street Row. East Street was the waterfront street running from Jackson to Folsom, or part of the Eddy Survey (OLD) Seawall. East Street was incorporated into the Embarcadero port facilities and roadway with the construction of the New Seawall. This block includes the Audiffred Building (110-116 The Embarcadero), the East Street Improvement Company (128-132 The Embarcadero), the Hihn/Meyer

Building (137-146 The Embarcadero), the Embarcadero Inn (144-146 The Embarcadero) and the Embarcadero YMCA. With the exception of the YMCA, this block is predominantly retail on the ground floor with office space above. Adjacent to the YMCA building is Bay Side Plaza, a recent seven story office building that is a part of Rincon Point Redevelopment Project area.

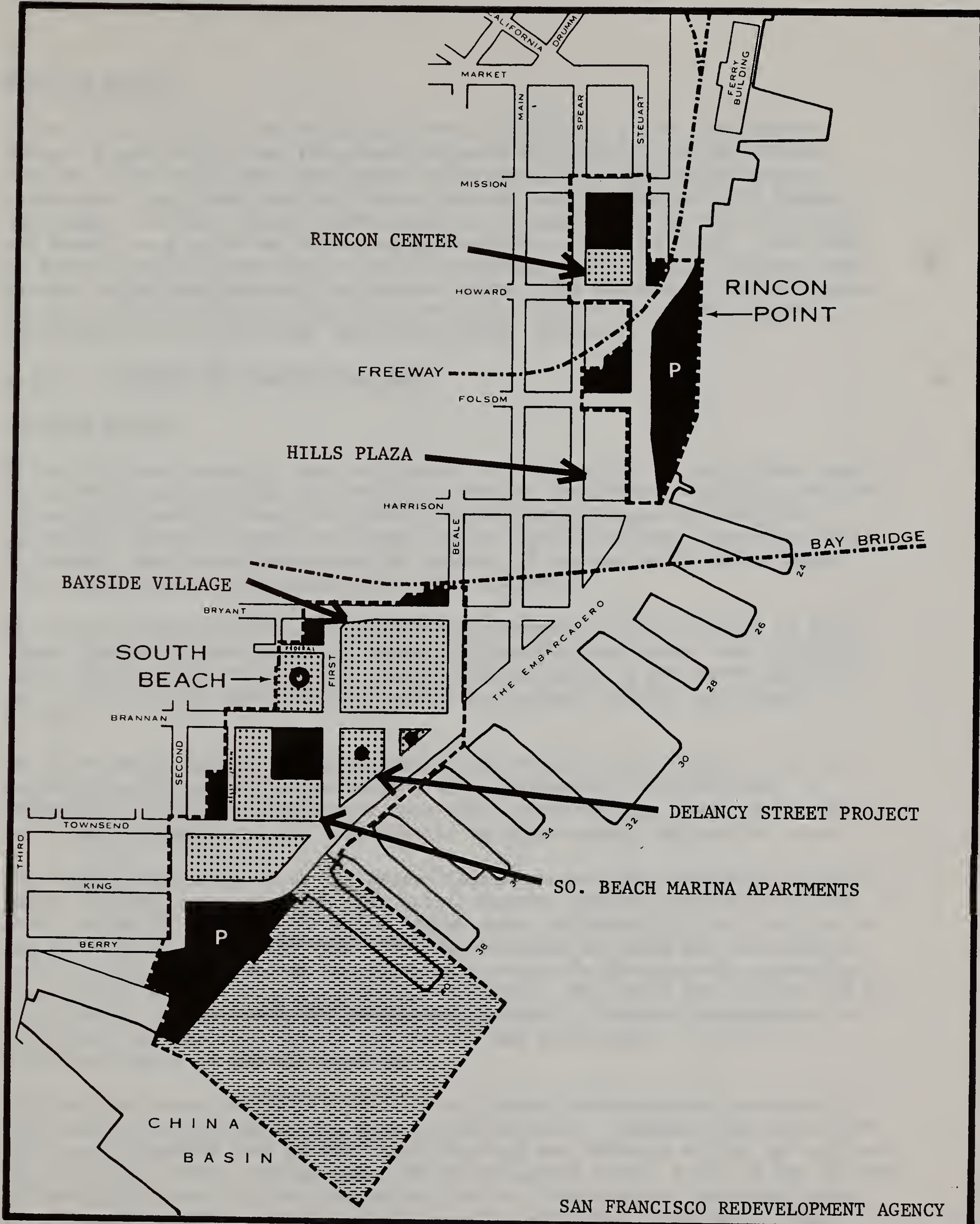
The Rincon Point Redevelopment Project area includes a four block area along the Embarcadero between Mission and Harrison Streets. The former Rincon Annex Post Office is currently undergoing redevelopment for retail and residential usage. The portion of this redevelopment area south of the elevated freeway structure includes the Seaman's Institute building and surface parking areas west of Steuart Street. East of Steuart is a surface parking lot and an adjoining wood frame vacant structure which are located on the Port of San Francisco's property. Adjacent to the Port's property is the Marine Terminal Corporation building. This warehouse type structure houses a maritime related (stevedoring) business which hires longshoremen and clerical staff for work on some of the piers. Most of the remaining Rincon Point project area consists of portions of the Promenade and the Embarcadero Roadway.

The Hills Brothers Coffee building and property is located in the block south of Folsom between Steuart and Spear Streets. This development project, under construction, rehabilitates and converts the historic building into all office use, totaling about 217,000 gross square feet of office space and 100 parking spaces in the existing basement. New construction will add about 370,000 gross square feet of office space; 40,000 gross square feet of ground level retail space; 85 residential units (85 units); and 500 parking spaces located in the basement level beneath the mixed-use building.

Rincon Hill serves as the western anchorage of the Bay Bridge. Land uses in the hill area are rapidly changing from office support and light industry to secondary office uses. The lot by lot mix of office support and office uses of Rincon Hill has become characteristic of the South of Market area.

The South Beach Redevelopment Area adjoins the southern boundary of the study area. The portions of the redevelopment project which are adjacent to the study area include Bayside Village, a 650 unit residential complex under construction, and the Delancey Street Embarcadero Square project. The Delancey Street project, under construction, includes 155 residential units and neighborhood commercial. These new developments face directly onto The Embarcadero. Other development projects, including the small boat harbor at the foot of King Street, are noted on Figure 3.1-5.

Other portions of the land use study area south of Market Street are more intensively developed office land uses. West of Steuart Street, the blocks bounded by Market and the elevated Embarcadero Freeway structure have been developed into a south of Market high-rise office district. However, along most of the Embarcadero Roadway, the 40 foot and 84 foot height limits have preserved a transition zone between the office towers and the waterfront. The study area contains a mixture of architecturally and historically significant buildings.


CALIFORNIA
DRUMM
MARKET
MAIN
SPEAR
STEUART
FERRY BUILDING
MISSION
RINCON CENTER
HOWARD
RINCON POINT
P
FREEWAY
FOLSOM
HILLS PLAZA
HARRISON
BEALE
BAY BRIDGE
24
BAYSIDE VILLAGE
BRYANT
26
SOUTH BEACH
FEDERAL
FIRST
THE EMBARCADERO
28
BRANNAN
SECOND
30
DELANCY STREET PROJECT
TOWNSEND
32
34
THIRD
KING
SO. BEACH MARINA APARTMENTS
BERRY
P
38
CHINA BASIN

SAN FRANCISCO REDEVELOPMENT AGENCY

SFRA REDEVELOPMENT PROJECT AREAS FIGURE 3.1-5

▒ RESIDENTIAL
■ COMMERCIAL
P MAJOR PARK
▨ SMALL BOAT HARBOR
● NEIGHBORHOOD COMMERCIAL
○ LIGHT INDUSTRY
--- PROJECT BOUNDARY

SOURCE: SAN FRANCISCO REDEVELOPMENT AGENCY

800 FEET

NORTH OF MARKET

Three of the north of Market blocks contain buildings of the Embarcadero Center, a part of the San Francisco Redevelopment Agency's Golden Gateway Complex. Two additional high rises, and a small scale tradition line of structures along Drumm and California Streets complete the north of Market land uses. The California Street cable car turnaround at California, Drumm and Market is a major San Francisco National Historical Monument. The north of Market project study area is almost completely built to the capacity that current zoning and planning regulations allow. The Embarcadero Center, Mutual Benefit Life Building and the Union Bank Building are in the most densely developed blocks in the MUNI Metro Turnaround study area.

3.1.3 TRENDS AND PLANNED LAND USES

SOUTH OF MARKET

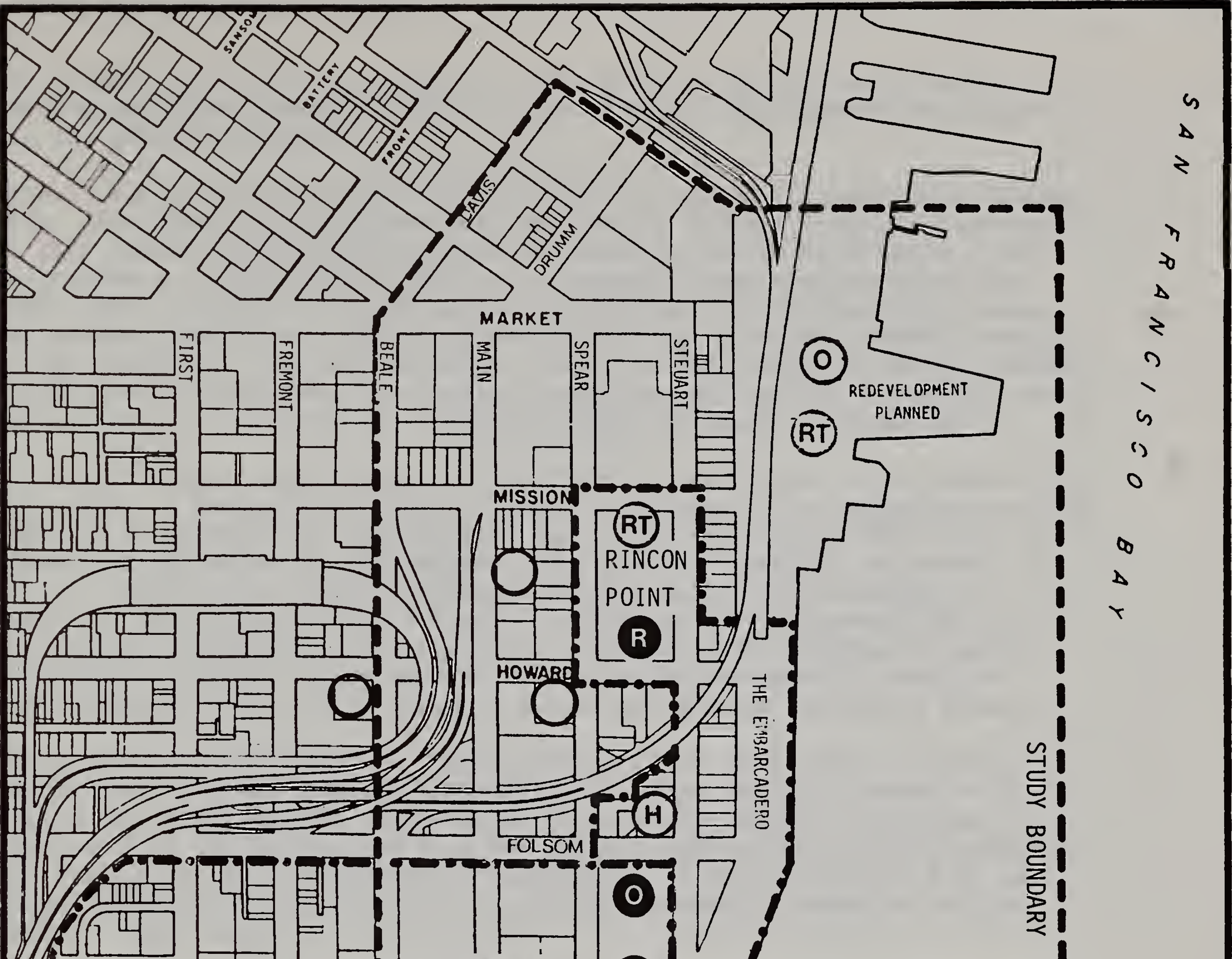
There have been dramatic land use changes in the south of Market Street area in San Francisco over the past decade. Current development activity, proposed projects and special area plans point to even more changes for the area. During the 1970s, 9.2 million square feet of new office space was built south of Market; this constitutes about 60 percent of all new major office space built in downtown San Francisco over that period.

The Rincon Point-South Beach Redevelopment projects will contribute to this trend with the redevelopment of vacant or underutilized lands into 1,182,000 square feet of commercial space, 2,554 dwelling units, a 690 berth marina, a hotel, and 514,000 square feet of public access/park spaces (see Figure 3.1-5).

The South Beach subarea of the Redevelopment Project (see Figure 3.1-6) is rapidly developing as a neighborhood, with residential, neighborhood commercial, park and recreational uses under construction. Most of the South Beach Redevelopment area will be devoted to high density residential uses.

The Rincon Point subarea of the Redevelopment project will include commercial, hotel, housing and park uses. The Postal Service has relocated most of its mail processing functions from the Rincon Annex building to a new facility in the India Basin Industrial Park. The Rincon Annex building has been historically restored and much of the space made available for adaptive commercial reuse with a new 300 unit residential structure. The hotel may include 400 to 800 units at a site along the Embarcadero Roadway. Private redevelopment of industrial or warehouse spaces into office and retail uses accounts for additional south of Market projects.

The Ferry Building complex is perhaps the largest redevelopment opportunity remaining in the Market Street area of the project. Proposals have been made that would renovate most of the Ferry Building and portions of the Agriculture Building with office, restaurant, retail and public uses. Piers 24 and 26 may be developed, under current proposals, into an international yachting center for recreation and public access on the south of Market waterfront. Port plans were to redevelop Pier 30/32 into a container freight facility; however, the Port is currently considering other uses for the location.


SAN FRANCISCO BAY
SANSO
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
O
REDEVELOPMENT PLANNED
RT
MISSION
RT
RINCON POINT
R
HOWARD
THE EMBARCADERO
STUDY BOUNDARY
H
FOLSOM
O
RINCON HILL
HARRISON
O
PLANNED RECREATIONAL
RC
BAY BRIDGE
RC
R
BRYANT
R
R
R
SOUTH BEACH
BRANNAN
R
R
VACANT
RT
R

SOURCE: E. M. Rose and Associates

CUMULATIVE MAP

FIGURE 3.1-6

OFFICE CONVERSIONS	OFFICE CONSTRUCTION	RESIDENTIAL CONSTRUCTION	RETAIL CONSTRUCTION	HOTEL CONSTRUCTION
○ PLANNED	Ⓞ PLANNED	Ⓡ PLANNED	(RT) PLANNED	Ⓗ PLANNED
● COMPLETED 1985-88	O COMPLETED 1985-88 UNDER CONSTRUCTION	R COMPLETED 1985-87 UNDER CONSTRUCTION	RT COMPLETED 1985-87 UNDER CONSTRUCTION	

800 FEET

In addition, there are currently two other major projects planned which involve major new uses with areawide significance: the Mission Bay proposal and the Rincon Hill Plan.

Mission Bay is a major redevelopment proposal south of the Turnaround Project area. The Mission Bay Plan has been prepared by the San Francisco Department of City Planning in conjunction with the Santa Fe Realty Corporation. An Environmental Impact Report (EIR) is in progress which assesses potential impacts for a variety of development alternatives for the Mission Bay area. The Mission Bay project area encompasses 300 acres along the eastern shoreline of San Francisco. The eastern border runs from King Street to Seventh Street (I-280) down to Mariposa; the western border varies from Third Street to China Basin Street and includes the bayfront immediately South of China Basin.

The Environmental Impact Report for the Mission Bay project is in press as of July 1988. A Proposal for Citizen Review, published by the Department of City Planning in January 1987 and abridged and reprinted in April 1987, is a summary of the preferred alternative. The proposal specifies at least 7,577 to 7,701 market rate and/or affordable housing units, and 3,600,000 to 4,100,000 square feet office space. The proposal also includes 2,300,000 square feet of service, light industrial, research and development space, 2,200,000 to 340,000 square feet of retail commercial space, a hotel at 400,000 square feet, and 70 acres of public and private open space areas.

The Mission Bay Environmental Impact Report, to be published by the City, may revise some of these land use proposals. Reference should be made to the Mission Bay Environmental Impact Report for further project details and a discussion of the alternative land use plans. Implementation of the Mission Bay development plans would require amendments to the City Master Plan and zoning ordinance through approval by the City Planning Commission and the Board of Supervisors.

The Rincon Hill Plan, a part of the Master Plan of the City and County of San Francisco, proposes to induce private development capital to transform an underutilized South of Market industrial area into a new high density residential community. The Rincon Hill Plan covers an area of approximately 55 acres encircled by the portions of the Embarcadero Freeway and the western portion of the Bay Bridge structure which is located immediately adjacent to the project study area.

The Rincon Hill Plan proposes a combination of residential, commercial, industrial, and open space uses. Up to 7,500 residential units and 932,000 square feet of commercial space could be added to the Rincon Hill area under this plan. Public and private investments in the form of residential and San Francisco Bay waterfront recreational amenities will provide an added stimulus to the Rincon Hill redevelopment efforts. These primary developments include the Hills Plaza development project, the South Beach-Rincon Point redevelopment project, and the proposed Waterfront Park and Embarcadero Parkway projects. The San Francisco City Master Plan revisions proposed in the Rincon Hill Plan includes new land use classifications, new height map and bulk controls, street improvements, new public and private open space requirements, and specific setback controls to create a residential streetscape.

The City of San Francisco, as of June 1988, has received two proposals for redevelopment consistent with the Rincon Hill Plan. These two proposals are for a total of 350 housing units with ground floor commercial. The timing of additional Rincon Hill redevelopment depends on San Francisco housing market conditions (telephone interview; Lois Scott, Department of City Planning, June 27, 1988). Figure 3.1-7 illustrates the land use plan and the publicly accessible open space opportunities presented in the Rincon Hill Plan.

Together these projects constitute planning for a major shift of the south of Market corridor between lower Market Street and China Basin from industrial, warehouse, marine and secondary office support uses to more intensive office uses, high intensity housing and commercial uses.

NORTH OF MARKET

The north of Market portion of the study area is almost completely built to the capacity allowed by current zoning and planning regulations. Three blocks of the study area north of Market are within the Golden Gateway Redevelopment District which encompasses approximately ten blocks north of Market Street in the Embarcadero Center area. With the completion of Golden Gateway Commons III in 1983, very few development opportunities remain in the study area north of Market or areas immediately adjacent to the study area. The Golden Gateway project includes four mid-rise (22 to 25 story) apartment buildings, three blocks of low-rise townhouses and office structures, a 2.5 acre park, 240,000 square feet of office and retail space, and 930 parking spaces. Adjacent to the northern boundary of the study area, Pier 3 is used for storage space. The Klamath and Santa Rosa historic ships are moored at the pier and used as office space. Pier 5 is in substandard condition and is now vacant. Pier 7 is in poor condition and is used as surface parking. The Port plans to remove this pier and build a public fishing pier.

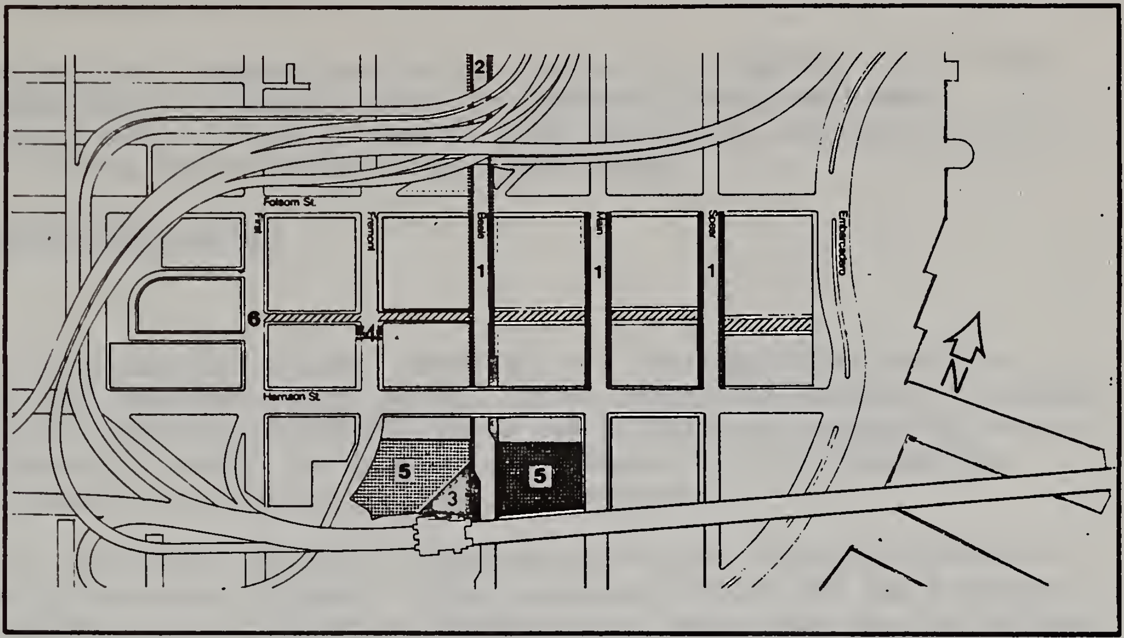
3.1.4 RELATIONSHIP OF LAND USE TRENDS TO TRANSPORTATION PROJECTS

When the study area and south of Market trends and planned land uses are considered with existing uses and current development activity, these projects are strong indicators of several major trends relevant to the Turnaround Project:

- Land values have generally increased during the past decade. Rising prices are overshadowing existing structural values and causing intense pressure for redevelopment. In the south of Market area, many older three and four story buildings exist at a fraction of the allowable intensity and height in an area easily accessible to the Market Street corridor.

- Industrial uses are being forced out of the Howard to Townsend Street corridor by rent pressure and many are moving to new industrial spaces south of China Basin, in the India Basin and Hunter's Point areas.

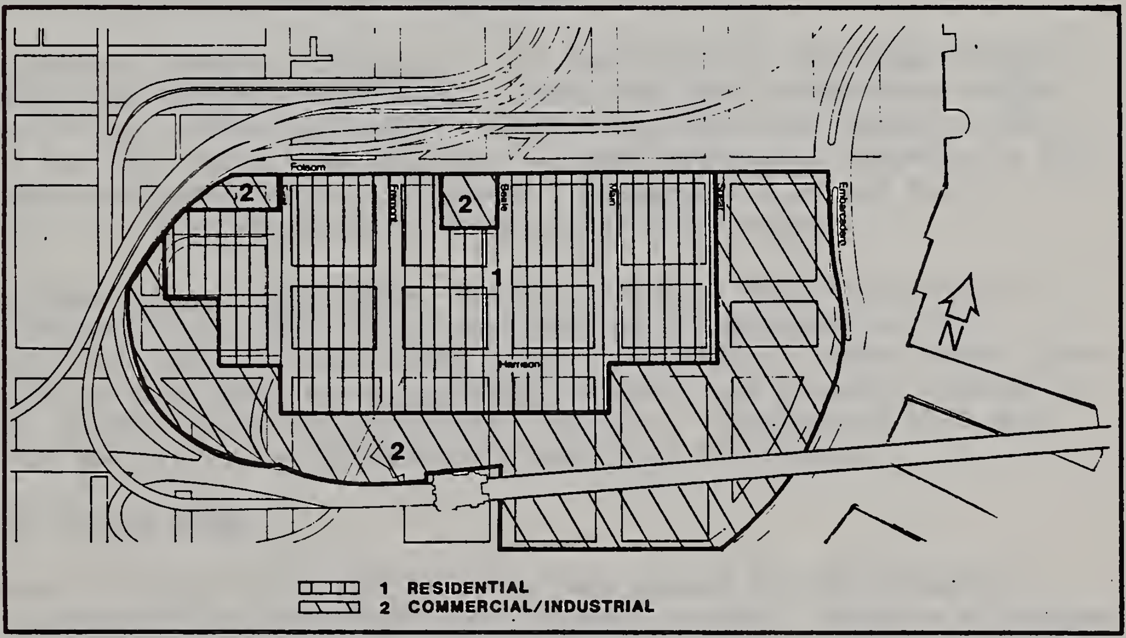
- The new uses being introduced to the area are more population intensive than the declining industrial uses. Office and commercial uses have much higher daytime worker and customer populations than industrial uses, and the proposed high intensity residential and hotel uses will introduce night and weekend activity in an area that has been largely abandoned after work hours.


Folsom St.
First
Fremont
Beale
Main
Spear
Embarcadero
Harrison St.
1
1
1
2
3
4
5
5
6
N

PUBLICLY ACCESSIBLE OPEN SPACE OPPORTUNITIES

LEGEND:

1. SIDEWALK WIDENING, STREET BEAUTIFICATION
2. SIDEWALK WIDENING, STREET BEAUTIFICATION, TO CREATE PEDESTRIAN CORRIDOR TO FINANCIAL DISTRICT.
3. PRESERVE OPEN SPACE AROUND BAY BRIDGE ANCHORAGE
4. CREATION OF WIDE PEDESTRIAN OVERPASS
5. RECREATION FACILITIES ON ROOFTOPS OF POTENTIAL INTERCEPT PARKING STRUCTURES
6. CREATION OF A PEDESTRIAN STREET NETWORK


Folsom
Fremont
Beale
Main
Spear
Embarcadero
Harrison
1
2
2
2
N
1 RESIDENTIAL
2 COMMERCIAL/INDUSTRIAL

LAND USE PLAN

In Block 3766, Lot 5 along Beale Street is situated in a hollow and is a suitable site for a parking facility. The Residential category applies to the northern portion of this lot only at a level equal to or above the elevation of Harrison Street.

RINCON HILL PLAN

FIGURE 3.1-7

SOURCE: San Francisco Department of City Planning

- These land use, economic and social changes will decrease use of large transport vehicles to move goods and materials along east/west corridors, and increase individual trips in private automobiles and by transit along predominantly north/south routes.

3.1.5 PLANS AND POLICIES

OVERVIEW

A variety of governmental actions, approvals and funding allocations are required for the construction of the MUNI Metro Turnaround facility. Federal, State, regional, and City and County plans and policies affecting the project as well as required permits and approvals are summarized in Appendix III. Figure 3.1-8 shows San Francisco agency jurisdictions.

The following discussion focuses on those agencies most directly affected by the MUNI Metro Turnaround Project. These agencies include the San Francisco Municipal Railway, the San Francisco Redevelopment Agency and the Port of San Francisco. The Municipal Railway Capital Improvement Program, and Short Range Transit Plan, the San Francisco Redevelopment Agency Rincon Point-South Beach Redevelopment Plan, and the Port of San Francisco Maritime Strategy II and Resolution 87-96 are discussed in detail below. Other agency plans and policies as summarized in Table 3.1-2 are discussed in further detail in Reference Document 9, San Francisco Municipal Railway Turnaround Project Plans and Policies Report.

MUNICIPAL RAILWAY/PUBLIC UTILITIES COMMISSION

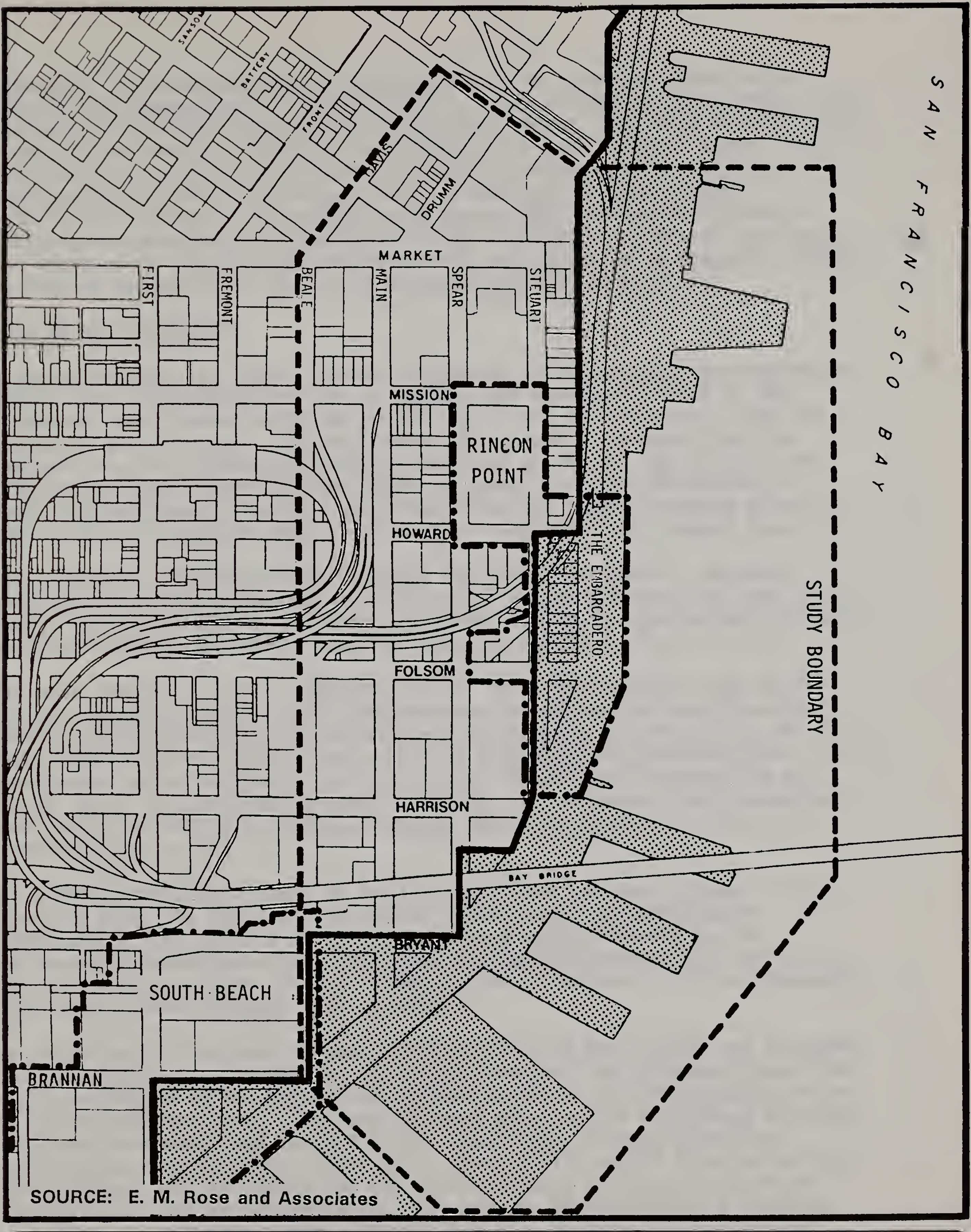
Capital Improvement Program, 1987-1992. The San Francisco Municipal Railway "Capital Improvement Program, 1987-1992," ranks the Metro Turnaround Project as MUNI's number one capital priority. After Metro operation began in 1980, ridership on the LRV system exceeded even the most optimistic projections made during the planning and construction phases. Construction of the Metro Turnaround will increase the capacity of the MUNI Metro subway.

Short Range Transit Plan, 1987-1992. The San Francisco Municipal Railway Short Range Transit Plan, 1987-1992, lists the Metro Turnaround as the agency's number one capital improvement project. The Short Range Transit Plan specifies a 60 percent increase in operating capacity and a major increase in train storage capacity with the Turnaround facility. The project will also facilitate the proposed Metro Extension to the China Basin area.

DEPARTMENT OF PUBLIC WORKS

The Department of Public Works (DPW) is the lead agency for the planning, design and construction of the Embarcadero Parkway project. This is a program to replace the existing Embarcadero Roadway; the proposal was developed as part of the I-280 Transfer Concept Program. The Turnaround Project surface facilities will be in the median of the Parkway. Specific DPW-enforced regulations applicable to the Turnaround Project construction are:

Noise Ordinance. Construction projects in San Francisco must conform to the requirements of the San Francisco Noise Ordinance. The ordinance requires that all powered construction equipment, except impact tools and equipment, emit not more than 80 dBA measured at 100 feet.


SANSO
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
RINCON POINT
HOWARD
FOLSOM
HARRISON
BAY BRIDGE
BRYANT
SOUTH BEACH
BRANNAN
THE EMBARCADERO
STUDY BOUNDARY
SAN FRANCISCO BAY

SOURCE: E. M. Rose and Associates

SAN FRANCISCO AGENCY JURISDICTIONS

FIGURE 3.1-8

SAN FRANCISCO REDEVELOPMENT AGENCY

▨ SAN FRANCISCO PORT COMMISSION

800 FEET

Procedure for Hazardous Wastes Soil Analysis. San Francisco regulations require the preparation of a site history to investigate hazardous waste soil contamination before a building permit can be issued. The site history is to contain a written site history description and a soil analysis report. The soil analysis report must indicate if any soil contamination exists that exceeds federal and/or state Applicable or Relevant and Appropriate Requirements (ARARs). If contamination beyond ARAR standards is found, a mitigation process must be undertaken before a building permit can be issued. The Director of Public Health determines if the report is unacceptable within 30 days of submission to DPW and the Director of Public Health.

PORT OF SAN FRANCISCO

Maritime Strategy II, 1979. The San Francisco Port Commission has exclusive powers under the 1968 Burton Act to manage, and operate the Port of San Francisco lands according to the provisions of the Charter of the City and County of San Francisco, the 1968 Burton Act Transfer Agreement and the regional and local waterfront agency plans and policies. The Port of San Francisco consists of 6.5 linear miles of waterfront from Fort Mason to Hunters Point Naval Shipyard, certain adjacent new Seawall created lots and certain land designated "Port Priority Use" land under the Seaport Plan.

Port plans and policies are articulated in several documents: Maritime Strategy II, the Maritime Master Plan for the Southern Waterfront; the Seaport Plan; the Central and Northeastern Waterfront Plans; the Special Area Plan for the San Francisco Waterfront; and the Total Design Plan, Piers 7 to 24.

The main goal of the Port Commission in the Turnaround Project area is to optimize the development of the northeastern waterfront for uses compatible with the BCDC Special Area Plan for the San Francisco Waterfront and the Total Design Plan, Piers 7 to 24, and the City's Northeastern Waterfront Plan. Port development should maintain a proper balance of maritime, nonmaritime and public uses. The revenues generated from office, commercial and recreational uses should be utilized to support growth and modernization of the Port's southern waterfront.

Waterfront planning for Port of San Francisco lands is done through a joint planning effort of the City and the Bay Conservation and Development Commission. The northern area down to China Basin is covered by the Northeastern Waterfront Plan. Maritime Strategy II includes all Port lands (Port Commission of the City and County of San Francisco: Official Statement Relating to Revenue Bonds, 1984, page 11).

The MUNI Metro Turnaround Project area falls within the Port of San Francisco jurisdiction for the two blocks of Steuart from the top of Howard Street and for any portions of the Turnaround Project extending onto The Embarcadero at or near Harrison Street. The Port includes this land in a planning and land use zone, extending from Piers 7 to 24, identified as urban waterfront recreational and open space (page 10). Piers 22 1/2 and 24 would be the only piers between the Bay Bridge and the Ferry Building according to Maritime Strategy II. Current proposals call for developing Piers 24 to 26 into an international yachting center. Pier 22 1/2 will continue as the fireboat/firehouse station.

In the Total Design Plan, Pier 24 is to be developed as a commercial recreation complex with shops, restaurants, entertainment, public assembly and open space uses. Inland of the recently developed Promenade and bayside of the new Embarcadero Roadway alignment, a new six acre park is to be created as part of the Rincon Point-South Beach Redevelopment area (page 17).

Resolution No. 87-96. San Francisco Port Commission Resolution No. 87-96 establishes policies and procedures for review, approval and mitigation of interagency and publicly sponsored projects on Port lands. For major projects, review and approval is required at three stages:

- Schematic design review,
- Working design review, and
- Final review/contract documents.

All proposed Port property projects shall be reviewed for potential impact on Port operations. Port policy requires compensation, at fair market value, for the loss of revenues and/or the value of land. It is the policy of the Port Commission "to have a replacement of lost land uses, supply of parking and compensation for increases in maintenance costs associated with projects proposed on Port land by another party(ies) (pages 1, 3)." The Port is responsible for consulting with the State Lands Commission to establish conformance with the public trust provisions.

SAN FRANCISCO REDEVELOPMENT AGENCY

Rincon Point-South Beach Redevelopment Plan, 1980. The project area block of Mission-Howard-Steuart-Spear, and the parcel bounded by the Embarcadero Freeway structure-Folsom-Spear-Steuart, are within the Rincon Point-South Beach Redevelopment Area. The redevelopment area includes a proposed park between Howard-Harrison-Steuart and the Port of San Francisco Bulkhead line. Additional portions of this San Francisco Redevelopment project extend from Beale and Bryant to the Bulkhead line. The eastern boundary of this section runs down to First and Bryant and zig-zags to China Basin at the line of Second Street, and includes Piers 46A, 44, 42 and 40 (see Figure 3.1-5).

The Rincon Point-South Beach project includes the creation of a 6.5 acre waterfront park by rerouting The Embarcadero onto the Steuart Street right-of-way between Howard and Harrison Streets. The Redevelopment Plan features residential development on the Howard Street end of the Rincon Annex Post Office site; rehabilitation of the Annex as commercial and office space; office development at Howard and Steuart on the south end of the East Street row; and a 700 room hotel near the Embarcadero Freeway fronting on Folsom between Main and Spear Streets. A total of 2,554 housing units and 1,182,000 square feet of commercial space is planned for this redevelopment area. The Rincon Point-South Beach Redevelopment Plan encourages the construction of the MUNI Metro rail service extension into the area.

3.2 SOCIAL AND COMMUNITY CHARACTERISTICS

3.2.1 POPULATION AND AFFECTED SOCIAL GROUPS

DEMOGRAPHIC CHARACTERISTICS

The City's 1985 residential population was 718,500 and although the number of San Francisco residents has increased since 1980, the number remains far short of the 1960 population of 740,300. As shown in Table 3.2-1, the population is expected to surpass the 1960 population level and increase to over 780,000 by 2005.

Similarly, study area population has begun to increase after 20 years of decline (see Tables 3.2-2 and 3.2-3). The population in the study area is also expected to increase steadily through 2005. The increase reflects the housing developments proposed and currently under construction in the area.

For specific age groups, the study area population varies from citywide statistics. For example, in 1980 those under 18 years represented 4 percent of the study area population, whereas citywide the percentage was 17 percent. Conversely, the percentage of seniors (60 years and older) living in the study area was significantly higher than the citywide percentage, 32 percent and 20 percent, respectively. In between these two age groups, study area and citywide percentages were much more consistent. 64 percent of the study area population was in the 19 to 59 age category compared with 62 percent of the citywide population.

San Francisco has a large minority population. In 1980, 311,900 residents or 46 percent of the total population were minority. In the study area, the minority population percentage of 41 percent was consistent with citywide percentage. Asians and Pacific Islanders (primarily Filipinos) represented the largest population group at 29 percent. The Black population was approximately 500 or nine percent, and there was a three percent mix of Hispanics and other minorities.

From 1970 to 1985, the citywide median household income more than doubled (from $10,400 to $29,550) at a rate greater than inflation and substantially higher than the nationwide figure of $20,900. Despite this relatively high income level, 20.5 percent or 29,100 families citywide had incomes of less than $10,000. In the study area, the household income in 1985 varied significantly, ranging from a high of $33,900 to a low of $7,142.

TRANSPORTATION DISADVANTAGED

The elderly, the young, the poor, and the disabled do not share the same level of mobility enjoyed by most of the population. As a result they are referred to as transportation disadvantaged as they are dependent on public transportation.

Within the study area, census tracts 178 and 179 had a high portion (90 percent) of low income and minority residents who had no automobiles. Sixty percent of their trips to work were either by public transportation or walking. Five percent of the population were disabled persons.

TABLE 3.2-1. CITYWIDE POPULATION

1960	1970	1980	1985	1990	1995	2000	2005
740,300	715,800	678,900	718,500	744,000	760,000	773,000	780,700

TABLE 3.2-2. STUDY AREA POPULATION

1960	1970	1980	1985	1990	1995	2000	2005
5,200	4,500	4,200	5,000	7,200	8,400	9,700	10,100

TABLE 3.2-3. POPULATION CHANGE IN STUDY AREA BY CENSUS TRACTS (1960 - 1985)

	POPULATION			
CENSUS TRACT	1960 (1)	1970 (2)	1980 (2)	1985 (3)
115	1,061	1,011	251	275
116	934	1,938	1,597	1,732
117	842	719	1,623	2,062
176	941	315	354	418
179	1,458	554	374	532
TOTAL	5,236	4,537	4,199	5,019

(1) U.S. Census Bureau Source: California Labor and Statistical Library.

(2) U.S. Census Bureau Source: California Labor and Statistical Library.

(3) ABAG Projections 1980-2005, San Francisco by Census Tracts.

3.2.2 HOUSING AND NEIGHBORHOODS

Of the total housing stock in San Francisco, 85 to 90 percent are multi-family units. Between 1985 and 1986, approximately one third of the City's 2,500 new housing units were built within a mile of the Transamerica Pyramid, located at the northern edge of the Financial District at Montgomery and Washington Streets. The City anticipates that, in accordance with this trend, as many as half of all new units will be constructed in the vicinity of downtown.

Housing costs in San Francisco are among the highest in the nation. For example, a two bedroom single family home or condominium can range from $180,000 to well over a million dollars. $250,000 for a two bedroom unit is a median price. For those earning less than $30,000 per year and having the greatest need for housing, the majority of new housing is unaffordable.

City policy has attempted to alter this situation by encouraging construction of mixed income housing. In accordance with this City policy, residential development in the project vicinity is incorporating low and moderate units into large-scale residential complexes. Currently, approximately 2,900 units are under construction or planned to be built in the project area. Of this total, the San Francisco Redevelopment Agency has planned for the construction of 1,670 units. The Agency has issued $162.7 million or 25 percent of total citywide California Senate Bill 99 bonds for housing in the project area. The Redevelopment projects near The Embarcadero, identified in Figure 3.1-5, are:

Bayside Village	840 units
Rincon Center	316 units
South Beach Marina	414 units

The majority, 80 percent, of these units are priced at affordable market rates and 20 percent are moderate income units. (1)

Additionally, Delancy Street Foundation is constructing 177 low income (2) units along The Embarcadero south of Brannan Street, and Hills Plaza at Steuart and Folsom Streets will include 85 residential units.

3.2.3 PUBLIC SERVICES

POLICE SERVICES

The police services in the study area are handled through Southern Station located at the Hall of Justice, 850 Bryant Street. The area is patrolled by car. There are no walking patrolmen in the area.

---

(1) Moderate income is defined as 150 percent of citywide median income. For a single person, the level is $44,600. For a family of three, it is $57,300.

(2) Low income is defined as 50 percent below median income or $16,700 for a single person and $21,450 for a family of three.

In recent years there has been an increase in service alarm calls at the new highrises. The majority of these calls have been due to alarms being incorrectly set or the inability to turn the alarms off. There has not been an increase in crime in the area.

FIRE SERVICES

The fire services in the study area are handled through Fire Station 35 at Pier 22 1/2, at the foot of Harrison Street. There is an average of seven firemen on duty. The station has one engine and one fire boat.

In recent years there has been an increase in alarms in the highrises primarily due to the sensitivity of the fire alarm systems in the new buildings. Additionally, there has been a increase in medical response calls due to increased population in the area.

3.3 ECONOMIC AND FINANCIAL CHARACTERISTICS

3.3.1 URBAN ECONOMY

DEVELOPMENT TRENDS

In 1965 the total downtown office space was 26 million square feet. By 1984, total downtown space had increased to 55 million square feet, an increase of 29 million square feet. Roughly one half of this development took place since 1978.

The approval and adoption of the Downtown Plan culminated six years of public debate on development controls. (See Appendix III for summary of the Downtown Plan.) The Plan, which was designed to cut by 60 percent the City's pace of highrise development, was hailed nationally for setting downtown growth limitations. The San Francisco Board of Supervisors adopted the zoning changes embodied in the Plan in September, 1985. The Plan allows approximately 2.85 million square feet of new offices over three years, and places an annual cap on development citywide at 950,000 square feet. The Downtown Plan fees increase the cost to develop in downtown San Francisco by $13.34 per square foot.

In November, 1986, Proposition M was approved by the voters of San Francisco, amending the Office Development Limitation Program of the Downtown Plan. Proposition M changed the annual limitation of office development from 950,000 square feet to 475,000 square feet, as one of its key elements.

Despite the many regulations, limitations and increased developers fees, San Francisco continues to be viewed as a prime location for developers and investors. For example, the downtown office vacancy rate was 18.1 percent in the first quarter of 1987 and declined to 13.85 percent by the last quarter of 1987 (Coldwell Banker, 1988). Some of the vacant spaces, especially in the South of Market area, are being occupied by companies moving from one office to another in San Francisco rather than expansion or relocating businesses from another city. However, new companies, mainly small businesses, and jobs have also developed, such as printing services, office supplies, computer services, messenger services, etc.

EMPLOYMENT TRENDS

In 1987 there were 2.8 million people employed in the nine-county San Francisco region of which 572,000 were employed in San Francisco. The five largest employers in San Francisco in 1987 were:

- University of California, San Francisco - 11,300
- Bank of America - 9,900
- Wells Fargo - 7,500
- Pacific Gas & Electric - 6,800
- Pacific Telesis Group - 6,600

In 1986 approximately 160,600 people were employed and 3,237 companies were located in and around the study area covering zip codes 94105 and 94111* (see Figure 3.3-1). Forty four percent or 1,415 of the companies in this area employed 1 to 5 people; 20% or 646 companies employed 6 to 10 people; and 18% or 594 companies employed 10 to 25 people.

The largest number of employees are in the financial sector (banks, savings and loans, mortgage companies, insurance companies and real estate interests) representing 46,400 employees, 29 percent of the total employed, and 765 businesses. 30,570 employees, 19 percent of the total employed and 1,255 businesses, are in the service sector (law firms, management consultants, public relations, hotels and computer services, etc.).

The proposed 1,100,000 square feet of new office/retail space in the study area would generate approximately 4,400 jobs (some new and others relocating to the study area). The development of the 800 room hotel and the proposed Port of San Francisco projects at Piers 24 and 26, and 30/32 in the study area will generate additional employment opportunities.

3.3.2 FISCAL PROFILES

CITYWIDE

The fiscal 1988-1989 projected budget had the City facing a $172.4 million deficit. According to the State constitution, cities and counties cannot start a new year with an unbalanced budget.

The $172.4 million deficit was a projected deficit, not a real deficit. The City is nowhere near default as New York City and Cleveland were in the 1970s. The City is currently paying its bills and has relatively low long term debt and enjoys a good credit rating.

The City needs to raise additional money or cut costs, or both, prior to July 1, 1988. In order to meet the deficits, a combination of steps were taken that included freezing wages of City employees, layoffs, increasing taxes (sales and business taxes), increasing MUNI fares, and reducing public services (ranging from public works, hospital care, parks, etc.).

Other revenue sources include the following:

(1) Sales Tax: based on a rate of 0.125 percent of gross retail sales;

(2) Utility Users Tax: correlates directly to the users consumption levels of various utilities and is used to offset the cost of providing electricity, gas, water, sewage and telephone services to customers;

---

* To determine employment trends, the study area boundary line was extended beyond the original study area. The extended study area boundary line - incorporates two zip code areas, 94111 and 94105. Zip code area 94111 covers the area between Pier 1 and 35, Sansome, Kearny, Sacramento, Battery, Market. Zip code area 94105 covers Market and 3rd to Folsom, 2nd, Bryant, Beale to Embarcadero to Market.

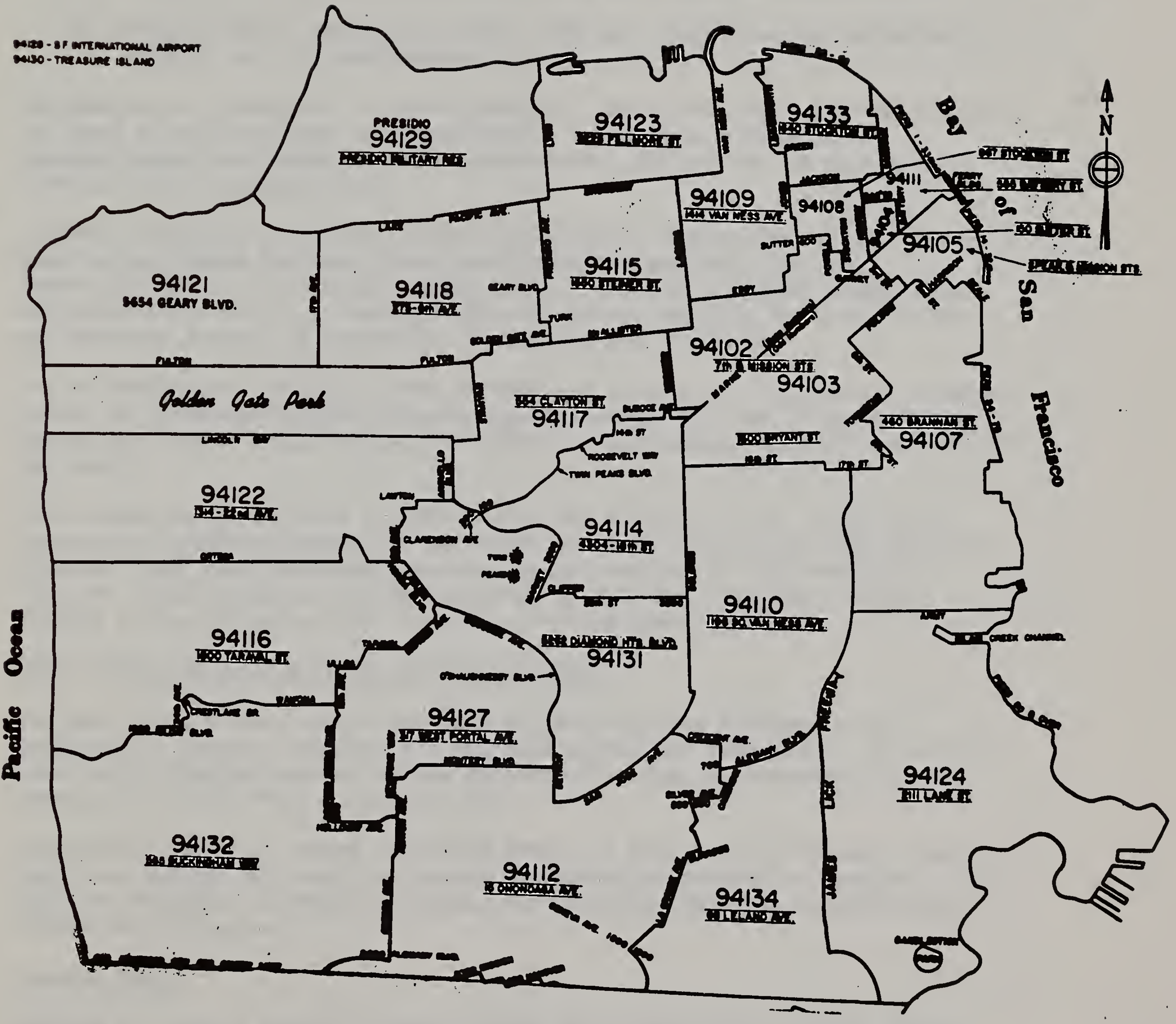

94128 - SF INTERNATIONAL AIRPORT
94130 - TREASURE ISLAND
PRESIDIO
94129
PRESIDIO MILITARY RES.
94123
FILLMORE ST.
94133
STOCKTON ST.
Bay
N
94109
1414 VAN NESS AVE.
94108
94111
94104
94105
of
SPEAR & MISSION STS.
San
94121
9654 GEARY BLVD.
94118
94115
94102
7th & MISSION STS.
94103
1600 BRYANT ST.
460 BRANNAN ST.
94107
Francisco
FULTON
Golden Gate Park
LINCOLN WAY
CLAYTON ST.
94117
ROOSEVELT WAY
TWIN PEAKS BLVD.
94122
LAWTON
CLARENDON AVE.
TWIN PEAKS
94114
4304 - 18th ST.
94110
1198 SO. VAN NESS AVE.
ISLAIS CREEK CHANNEL
94116
1900 TARAVAL ST.
DIAMOND HTS. BLVD.
94131
O'SHAUGHNESSY BLVD.
CRESTLAKE DR.
94127
WEST PORTAL AVE.
MONTEREY BLVD.
94124
LANE ST.
94132
BUCKINGHAM WAY
94112
ONONDAGA AVE.
94134
LELAND AVE.
Pacific Ocean

FIGURE 3.3-1
SAN FRANCISCO ZIP CODES

(3) Parking Tax: assessed on 20 percent of gross income of parking garage space not reserved for residential use;

(4) Payroll and Gross Receipts Tax: paid in two ways: 1) firms with a tax liability in excess of $500 pay a tax equal to 1.5 percent of their total payroll exceeding $500; and 2) owners of buildings pay a 0.3 percent gross receipts tax on their retail income;

(5) Hotel Tax: 11 percent of gross price per night per room; and

(6) Transfer Tax: assessed at $5/$1,000 per sales price is collected at time of sale of real property.

Tourism is San Francisco's largest industry. Each year, more than $1 billion is spent in San Francisco by approximately 2.4 million visitors, conventioneers and delegates, and approximately $60 million is generated through hotel occupancy taxes.

The City attracted more than 70 major meetings at Moscone Center, more than 40 bookings at Brooks Hall and Civic Auditorium and approximately 400 conventions held at the City's major hotels. Some of the most prestigious annual conventions (e.g., American Trial Lawyers, American Bar Association, and American College of Surgeons) are held in San Francisco.

The citywide hotel occupancy rate in 1986 was 72 percent. At tourist oriented hotels at Fisherman's Wharf, the average occupancy rate was 80 percent and during the summer season it was 100 percent. The average room rate was $80.50 per night.

Total spending by visitors in 1986 was $1,343 million. Total spending by convention attendees staying in San Francisco hotels/motels in 1986 was $347 million. The total spending generated by conventions in 1986 was $576 million. This spending includes spending by attendees staying overnight outside of San Francisco and convention related spending.

MUNI CAPITAL FUNDING SOURCES AND REQUIREMENTS

The MUNI Metro Turnaround Project has the Metropolitan Transportation Commission's highest priority for new rail starts and extensions. As stated previously, the development of the Turnaround Project is essential for the extension of MUNI Metro to Mission Bay.

The project would be funded from UMTA Section 3 funds, State Guideway Funds, and local funds. At least two separate application grants for Section 3 funds will be submitted to UMTA for funding the fixed facility and rolling stock (light rail vehicles).

Federal Funds

SECTION 3. UMTA 3 Section 3 funds, which are discretionary capital grants, are authorized to finance transit capital improvement projects including: (1) the construction of new fixed guideway systems; (2) the acquisition, construction and improvement of facilities and equipment; (3) projects which enhance the effectiveness of mass transportation projects; and (4) the modification of equipment and fixed facilities (other than stations).

Section 3 funds finance up to 75 percent of the total costs of the project. The remaining 25+ percent would be funded from State and local funds.

State Funds

STATE GUIDEWAY PROGRAM. State Guideway Program funds have two funding sources: the State Highway Account funds and the Transportation Planning and Development Act (TP&D) funds. State Highway Account funds are from gasoline tax funds and can be used only to fund fixed guideway facilities. TP&D funds are general funds and can be used for fixed facilities and vehicle rolling stock. These funds could finance slightly more than 80 percent of the 25 percent non-Federal share required for Federal capital grants.

Local Funds

Local match funds come from a minimum of two sources: regionally administered funds, such as Bridge Tolls, and locally administered funds including San Francisco Municipal Railway Improvement Corporation, the Transit Impact Development Fee and Hetch Hetchy net revenues. Local funding could exceed five percent of the total capital funding since they cover all costs that are not grant fundable by Section 3 or State Guideway funds.

MUNI OPERATING FUNDING SOURCES AND REQUIREMENTS

According to the City Charter, MUNI cannot begin a new year with a budget deficit. MUNI's operating needs are projected to exceed its anticipated revenues by as much as $18 million in 1991-1992, depending on the service options that are implemented. As a result, the transit system may have to reduce service and/or increase revenues in the near future.

Wages and salaries are a significant portion of the MUNI annual costs (see Table 3.3-1). In 1981-1982 they accounted for 77 percent; in 1982-1983, 75 percent; in 1983-1984, 77 percent; in 1984-1985, 78 percent; and in 1985-1986, 76 percent.

The major factors that have caused the increased MUNI costs are 1) ongoing costs, accounting for 93 percent of increased costs, and 2) service changes accounting for seven percent of the growth in costs.

Currently, MUNI receives operating revenues from four sources, as indicated in Table 3.3-2.

1. Federal, State and regional subventions

2. San Francisco General Fund

3. Passenger fares

4. Advertising and miscellaneous services

Additionally, Transit Impact Development Fee (TIDF) funds, which were held in escrow pending a legal challenge, will be available in 1988/1989. TIDF funds may be used for capital and operating expenses related to downtown peak service increases beyond MUNI 1981 service levels.

TABLE 3.3-1. MUNI OPERATING COSTS, FY 1981-1982 TO FY 1985-1986 (MILLIONS OF DOLLARS)

	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Salaries, wages, benefits	$115.3	$122.8	$129.6	$158.9	$163.4
Fuels, supplies	22.1	27.2	28.8	30.8	34.7
Utilities, misc.	11.9	13.9	10.9	13.3	17.2
TOTAL	$149.3	$164.0	$169.4	$203.1	$215.3

Source: San Francisco Municipal Railway, Short Range Transit Plan 1987-1992,

TABLE 3.3-2. MUNI OPERATING REVENUE SOURCES, FY 1981-1982 TO FY 1985-1986 (000's)

	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Fare Revenue	$46,404	$51,078	$51,844	$55,501	$62,081
Non-Fare Operating	899	1,248	3,295	2,335	3,341
San Francisco General Fund	59,367	74,228	69,261	100,065	102,844
State/Regional Subvention	28,632	32,446	34,668	34,669	41,530
Federal Assistance	14,080	6,700	13,953	9,012	8,985
TOTAL	$149,383	$165,700	$173,024	$201,582	$218,781

Source: San Francisco Municipal Railway, Short Range Transit Plan 1987-1992, Federal Subventions. As stated previously, Section 9 is a Federal grant program that provides block grants for both capital and operating assistance. The funds are subject to Congressional action. Funds are appropriated by UMTA to urbanized areas according to population and service. MUNI's Federal operating subsidies ranged from a high of $14.08 million in 1981/1982 to a low of $8.02 million in 1987/1988, reflecting the current administration's policy to phase out transit operating subsidies.

State Subventions. State funding is from two sources: AB 1107 regional sales tax and Transportation Development Act (TDA) County sales tax. AB 1107 is generated by the 1/2 cent sales tax levied in BART counties. By State law, 75 percent of the revenue generated from sales taxes is allocated to BART, and 25 percent is shared between MUNI, BART and AC Transit. TDA Funding is generated by sales tax revenues collected within San Francisco.

State subventions have remained an almost constant share (around 19 percent) of MUNI revenues.

Regional Subventions. In FY 1986/1987, MUNI began receiving funds from BART as a means of recognizing that many passengers transfer from MUNI to BART, and would not choose to use BART without the access provided by MUNI. These patrons add to BART's overall ridership and thus increase its revenues. In the current year, BART provided $1.2 million to MUNI, and this contribution is expected to remain constant.

San Francisco General Fund. The ability of MUNI to fund new programs in any given year depends directly on the financial status of the City. The City's General Fund must pay for all operating expenses not financed by fares and subventions. The General Fund is the largest contributor to MUNI. The General Fund's share is increasing annually. In 1981/1982, it accounted for 40 percent or $59 million. In 1985/1986, its share had increased to 47 percent or $103 million.

Transit Impact Development Fee (TIDF). In addition to the revenues mentioned above, proceeds from the Transit Impact Development Fee (TIDF) will soon be available to the City, and could be used for operating improvements. Funds have been collected since 1981 to pay for a portion of the incremental costs of additional peak hour transit service required by new office development. The fee, set at $5 per square foot of new or converted office space, constructed in downtown San Francisco, is levied on commercial developers. At the present time, these revenues are invested in short term securities and held in escrow by the Treasurer of the City and County of San Francisco.

The legality of the fee was challenged in court by a group of developers, but its validity was upheld by the State Appellate Court in January, 1987. That decision was appealed to the State Supreme Court, and in April, 1987, the Court issued a decision not to hear the case. As a result, the decision by the State Appellate Court to uphold the legality of the fee remains in effect and the City may begin spending the funds. As of April, 1988, nearly $44.1 million has been collected, including accrued interest income. Of the total amount, however, about 30 percent is subject to another lawsuit, and the City must await that decision before those funds can be spent.

Passenger Fare Revenue. Passenger fare revenue is the second largest contributor to MUNI's operating budget, ranging from $46.4 million to $62.1 million from 1981-1982 to 1985-1986, respectively. Passenger fares comprised approximately 31 percent of MUNI's operating budget revenues in 1985-1986.

PORT OF SAN FRANCISCO

The Ferry Building area, owned and leased by the Port of San Francisco, is located at the foot of Market Street. The facilities owned by the Port in this area, the Ferry Building, Agriculture Building, the parking spaces, and Piers 15 to 32, generate revenues for the Port. The Ferry Building and the Agriculture Building are presently occupied by offices (law firms, architects, engineering firms, travel agents), restaurants and the Golden Gate Ferry Terminal.

Parking is a major source of revenue to the Port. There are approximately 1,800 parking spaces, on-street metered and monthly/daily lots that are under the jurisdiction of the Port. In addition, restaurants in the area depend on the availability of valet parking to serve their patrons.

The Port is presently considering offers from developers for the following piers:

Pier 15/17: a new proposal that would generate 400 to 500 boxcar traffic per year.

Piers 24 and 26: developers are proposing to build the San Francisco International Sailing Center which includes restaurants, shops, public access, and hosting boat shows and international sailing events.

Pier 30/32: various developers are discussing options to use this site.

The projects are in the discussion stages and will require Environmental Analysis prior to Port Commission approval, lease agreements, and various permit approvals.

SAN FRANCISCO RECREATION AND PARKS DEPARTMENT

Justin Herman Plaza, administered and maintained by Recreation and Parks, has become one of the key drawing spots in San Francisco and especially in the downtown. The Plaza attracts lunchtime crowds (brown baggers and restaurant crowds). Its close proximity to the waterfront, the many retail shops, and restaurants and street artisans attract many tourists.

Events, which are revenue generating to the Recreation and Parks Department, are scheduled throughout the year. Events range from Earthquake Preparedness, radio station sponsored events, rock concerts, SPCA adoptions of cats and dogs, and street vendors selling their handcrafted wares (pictures, pottery and jewelry). The summer months, autumn, and the Christmas season are the most heavily scheduled months for events.

3.4 TRAFFIC AND TRANSPORTATION

3.4.1 PUBLIC TRANSPORTATION CIRCULATION

The project area is served by several transit properties operating a variety of modes. The transit agencies are the San Francisco Municipal Railway (MUNI), Bay Area Rapid Transit (BART), and Golden Gate Transit Ferries. Additionally, immediately west of the project boundaries lies a regional transportation center, the Transbay Terminal, which is served by MUNI, AC Transit (Alameda-Contra Costa), SamTrans (San Mateo County Transportation District), Golden Gate Transit (Marin and Sonoma Counties), bus service to the Amtrak rail station in Oakland, and Trailways buslines.

Within the project boundary, MUNI operates 23 diesel and trolley lines, including ten express routes, five MUNI Metro lines, and one cable car line (see Figure 3.4-1). MUNI utilizes a bus turnaround for ten lines immediately south of Justin Herman Plaza on Mission Street.

MUNI Metro shares the Market Street subway with BART trains. Both systems utilize the Embarcadero Station located under the foot of Market Street to bring riders from San Francisco, the East Bay, and the Peninsula to destinations within the project area.

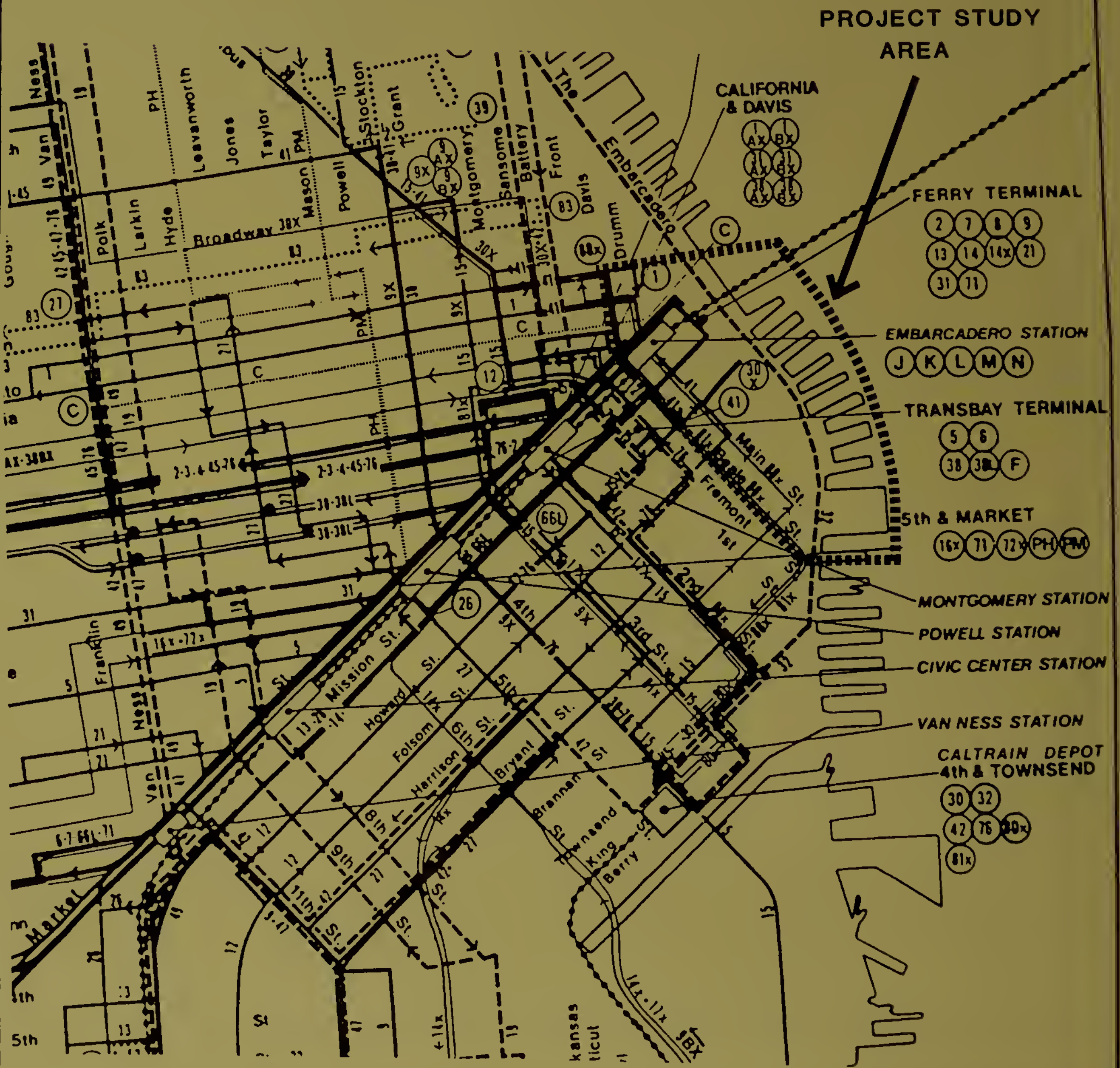
MUNI Metro trains converge from the southern and western portions of the City into the Market Steet subway at West Portal (lines K, L, and M) and Duboce Portal (lines J and N). All trains travel to and reverse direction at the Embarcadero Station. Trains operate daily, with weekday service commencing at 5:00 A.M. and finishing by 12:30 A.M. Late night (owl) buses provide substitute service between midnight and 5:00 A.M.

Of the 130 light rail vehicles, MUNI schedules 103 vehicles during the peak periods. The P.M. peak scheduling utilizes six minute headways on the J, L and N lines, and 12 minutes on the K and M. Except for single car J trains, all trains operate with two cars during the peak and can couple together at the portals as three and four car trains for their journey in the Market Street subway.

3.4.2 TRAFFIC VOLUMES/ROADWAYS CAPACITIES

The streets of primary interest within the project area are bounded by Clay Street on the north, Brannan Street on the south, Beale Street on the west and the Embarcadero on the east. Access to Interstate 80 is provided by an on-ramp to the Embarcadero Freeway at Beale Street near Mission. Traffic from the freeway system uses an off-ramp at Main Street.

Major north-south movements on The Embarcadero utilize two traffic lanes in each direction. The northbound lanes are easterly of the Embarcadero Freeway structure. The southbound lanes pass beneath the west column bays of the freeway structure in the vicinity of the Ferry Building. Steuart Street is two way, allowing MUNI trolley coach access to and from the bus turnaround. Spear Street has two lanes southbound, Main Street two lanes northbound, and Beale Street two lanes southbound.


PROJECT STUDY AREA
CALIFORNIA & DAVIS
1 AX, 1 BX, 1 AX, 1 BX, 1 AX, 1 BX
FERRY TERMINAL
2, 7, 8, 9, 13, 14, 14x, 21, 31, 71
EMBARCADERO STATION
J, K, L, M, N
TRANSBAY TERMINAL
5, 6, 38, 38L, F
5th & MARKET
16x, 71, 72x, PH, PM
MONTGOMERY STATION
POWELL STATION
CIVIC CENTER STATION
VAN NESS STATION
CALTRAIN DEPOT 4th & TOWNSEND
30, 32, 42, 76, 80x, 81x
The Embarcadero
Drumm
Davis
Front
Battery
Sansome
Montgomery
Grant
Stockton
Powell
Mason
Taylor
Jones
Leavenworth
Hyde
Larkin
Polk
Van Ness
Broadway
Main
Beale
Fremont
1st
2nd
3rd St.
4th
5th
6th
8th
9th
11th
Mission St.
Howard
Folsom
Harrison
Bryant
Brannan
Townsend
King
Berry
Franklin
Market
Kansas
30X
9X
83
PM
PH
C

SOURCE: SAN FRANCISCO MUNICIPAL RAILWAY

N

SCALE

FIGURE 3.4-1 MUNI LINES IN PROJECT AREA

Major east-west through movements are on Market, Mission, Howard and Folsom Streets. Market is a Transit Preferential Street and Pedestrian Oriented Street terminating at Steuart Street, offering two traffic lanes in each direction. Autos on Market Street flow in mixed traffic with MUNI vehicles. Mission Street has two lanes in each direction and, unlike Market Street, intersects The Embarcadero. Both Howard and Folsom Streets, which also intersect The Embarcadero, have four lanes operating one way westbound and eastbound, respectively. Parking is allowed on all streets except Market Street and, during the peak hours, on Mission Street.

Existing and projected volume to capacity ratios and corresponding Level of Service for intersections in the project area along The Embarcadero are shown in Table 3.4-1. The volume to capacity ratio describes the proportion of a roadway's capacity that is being utilized by vehicular traffic during a given time period. The greater the ratio, the more congested the roadway. A ratio of one or greater reflects serious delays and stop-and-go driving conditions. To clarify the degree of vehicular traffic congestion, V/C ratios are often translated into Level of Service (LOS) as indicated in Table 3.4-2.

Table 3.4-1 indicates that, during the P.M. peak, traffic flow along The Embarcadero currently has few delays except for the intersection of Embarcadero/Mission where drivers may experience 25 to 40 second delays. By the year 2000, this intersection could be operating at stop-and-go conditions, producing delays of over 60 seconds and long turning queues. Further south at Embarcadero/Folsom, traffic is expected to become slightly more congested, but not sufficiently to produce excessive delays or queuing lasting for more than one signal change. Because the Embarcardero Parkway is not being designed to provide greater roadway capacity, projected Levels of Service, as indicated in Table 3.4-1, are not expected to be altered.

TABLE 3.4-1. TRAFFIC CIRCULATION ALONG THE EMBARCADERO (P.M. PEAK HOUR)

	CURRENT (1986)		YEAR 2000	
INTERSECTION	VOLUME TO CAPACITY RATIO (V/C)	LEVEL OF SERVICE (LOS)	VOLUME TO CAPACITY RATIO (V/C)	LEVEL OF SERVICE (LOS)
Embarcadero/Mission	0.88	D	1.05	F
Embarcadero/Howard	0.55	A	0.66	B
Embarcadero/Folsom	0.63	B	0.76	C
Embarcadero/Bryant	0.47	A	0.56	A

Source: DKS Associates, 1986.

TABLE 3.4-2. LEVELS OF SERVICE FOR URBAN AND SUBURBAN ARTERIAL STREETS

LEVEL OF SERVICE (LOS)	DESCRIPTION	AVERAGE VEHICLE DELAY (SECONDS)	VOLUME TO CAPACITY RATIO (V/C)
A	Free Flow. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Insignificant delays.	0-5	0.0-0.59
B	Stable Operation. An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles. Minimal delays.	5.1-15	0.60-0.69
C	Stable Operation. Major approach phase may become fully utilized. Most drivers feel somewhat restricted. Acceptable delays.	15.1-25	0.70-0.79
D	Approaching Unstable. Drivers may have to wait through more than one red signal indication. Queues develop but dissipate rapidly, without excessive delays.	25.1-40	0.80-0.89
E	Unstable Operation. Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream from intersection. Significant delays.	40-60	0.90-0.99
F	Forced Flow. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections. Excessive delays.	greater than 60	1.00 and above (a)

(a) Forecast volumes may produce V/C ratios greater than 1.00, although actual volumes cannot, by definition, exceed capacity except for short periods of time.

Sources: "Highway Capacity Manual," Transportation Research Board, Special Report No. 209, Washington, D.C., 1985.

"Interim Materials on Highway Capacity," Transportation Research Board, Circular No. 212, Washington, D.C., January 1980.

3.4.3. PARKING FACILITIES

Within the project study area are approximately 9,750 on-street and off-street (public) parking spaces. In the area of the Ferry Building, off-street parking is augmented by metered on-street spaces opposite the Ferry Building and additional on-street spaces to the south and north of the Ferry Building. Motorcycle parking is also provided.

3.4.4 TRANSPORTATION PLAN

NORTHEASTERN WATERFRONT TRANSPORTATION IMPROVEMENTS

Background. During the 1950s and 1960s, plans existed to extend I-280 from its current terminus at 4th Street to the Embarcadero Freeway (1.4 miles). The planned 1.4 mile connection to the Embarcadero Freeway was not built because of opposition to a waterfront freeway. In 1973 an amendment to the Federal Highway Act, Title 23, authorized withdrawal of any unconstructed segments of the Interstate System and substitution of these segments with other highway or transit projects. This amendment was the basis for the development of the I-280 Transfer Concept Program Study and EIR.

On February 19, 1980, the San Francisco Board of Supervisors adopted Resolution No. 152-80 to withdraw the originally proposed connection between I-280 and the Embarcadero Freeway from the Interstate Highway system. The withdrawal of the Interstate segment received concurrence of the Metropolitan Transportation Commission and the Governor. On January 16, 1981 the withdrawal request was approved by the U.S. Department of Transportation. Potential street and transit projects satisfying the same transportation needs were identified.

On September 28, 1984, a Draft Environmental Impact Report (EIR) was published which presented studies of traffic, costs and environmental impacts for eight alternative combinations of potential projects. The City Planning Commission certified the Final EIR on May 23, 1985 (Resolution No. 10320), satisfying State environmental requirements. Preparation of project specific environmental documents, meeting Federal requirements, is currently underway. Specific elements of the I-280 Transfer Concept Program, exclusive of the Turnaround Project and improvements to the Transbay Terminal, are described below.

Embarcadero-King Roadway Reconstruction Plan. In March, 1987, the Board of Supervisors approved Resolution 161-87 which authorized the Director of Public Works to apply for, accept, and expend Federal Aid Interstate funds for preliminary engineering for roadway reconstruction along The Embarcadero and King Street.

The Embarcadero Parkway is a key element of a series of transportation projects designed to provide a variety of transit and highway improvements in the Embarcadero Corridor, and is the result of continuing study by various City departments of the seven projects which evolved from the I-280 Transfer Concept. The Parkway project involves:

- Reconstruction and beautification of the roadway along The Embarcadero between North Point and Second Streets. The new Parkway would contain four lanes of traffic with left turn lanes at various street intersections. The Municipal Railway would operate in a street right-of-way.

- Construction of a boulevard along the present alignment of King Street to connect The Embarcadero to the I-280 terminus near Sixth Street. The new boulevard would provide six lanes of traffic and MUNI Metro operation in the median.

The portion of the Parkway project between the Ferry Building and Bryant Street is currently in preliminary design and affect the MUNI Metro Turnaround Project. This section is shown on Figure 3.4-2. Proposed modifications to the existing Embarcadero Roadway in this section are described below*:

MARKET TO HOWARD. The northbound lanes would remain while the southbound lanes are shifted under the freeway structure. The Belt Railway would be relocated into a traffic lane.

HOWARD TO FOLSOM. The traffic lanes swing away from the waterfront to Steuart Street, thus vacating land for a new waterfront park. The Belt Railway main track would be relocated to a traffic lane, and the side tracks abandoned. A median is provided for the MUNI Metro Turnaround.

FOLSOM TO HARRISON. The traffic lanes remain in Steuart Street and would return to a waterfront alignment at Harrison Street. The Belt Railway and median would be unaffected. Median space is provided for a future Metro passenger station.

HARRISON TO BRYANT. The traffic lanes would remain in a waterfront alignment with a median provided for MUNI Metro.

The San Francisco Department of Public Works has included curbside parking along redesigned King Street and is studying the possibility of setting aside areas of the Embarcadero Parkway for parking. An Environmental Assessment analyzing the effects of the Parkway project on parking, business relocation, air quality, historical resources, and excavation of hazardous materials will be published in Summer, 1989. Engineering and design work are scheduled to be completed in 1991. Construction will commence shortly thereafter.

Interstate 280 Access Improvements. As part of the Mission Bay plan, CALTRANS would remove the I-280 elevated freeway from Third to Sixth Street and remove the existing Fourth Street off-ramp. New ramps would be constructed at Sixth Street and integrated into the King Street roadway redesign so that access to and from I-280 would be enhanced, facilitating traffic circulation between the Embarcadero, Mission Bay, and the I-280 freeway.

---

* The Parkway Project is under discussion and may ultimately vary from what is described in this discussion.

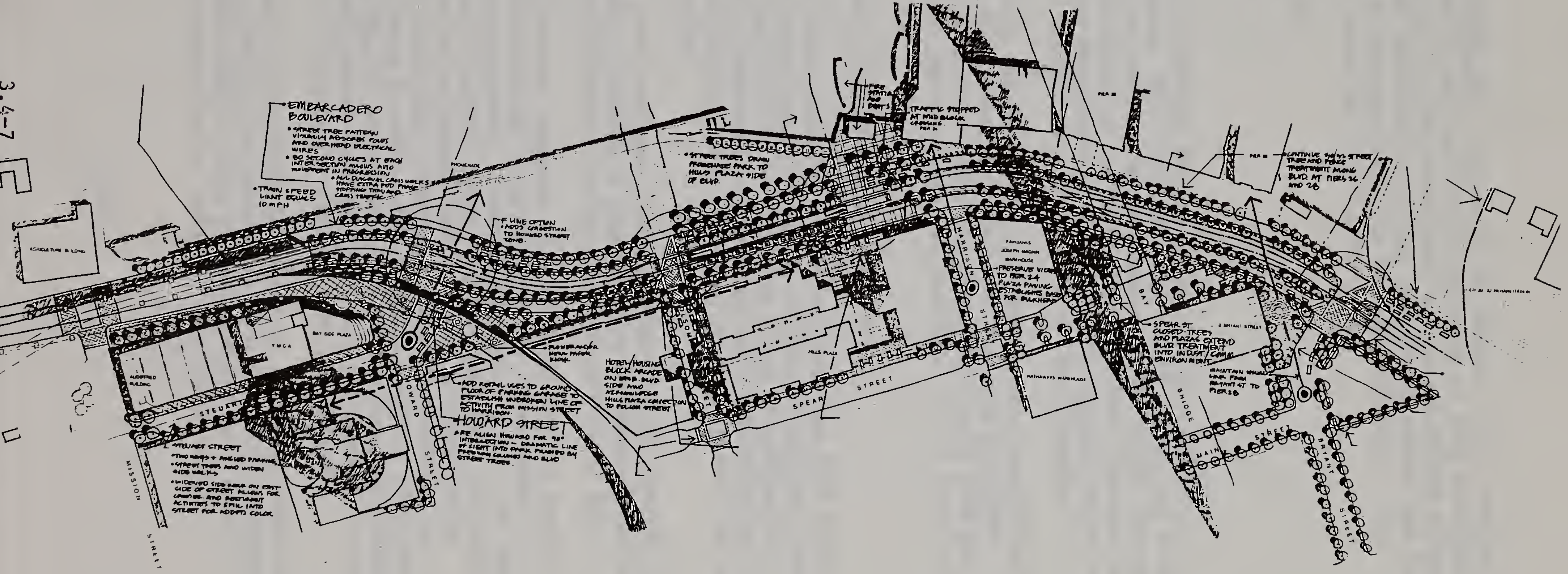

EMBARCADERO BOULEVARD
• STREET TREE PATTERN VISUALLY ABSORBS POLES AND OVERHEAD ELECTRICAL WIRES
• 90 SECOND CYCLES AT EACH INTERSECTION ALLOWS AUTO MOVEMENT IN PROGRESSION
• ALL DIAGONAL CROSS WALKS HAVE EXTRA PED PHASE STOPPING THRU AND CROSS TRAFFIC
• TRAIN SPEED LIMIT EQUALS 10 MPH
PROMENADE
F LINE OPTION
• ADDS CONGESTION TO HOWARD STREET ZONE.
• STREET TREES DRAW PROMENADE PARK TO HILLS PLAZA SIDE OF BLVD.
FIRE STATION AND BOATS
TRAFFIC STOPPED AT MID BLOCK CROSSING.
PIER 24
PIER 26
PIER 28
CONTINUE STREET TREE AND FENCE TREATMENT ALONG BLVD. AT PIERS 26 AND 28
AGRICULTURE BUILDING
AUDIFFRED BUILDING
YMCA
BAY SIDE PLAZA
STEUART
STEUART STREET
• TWO WAYS + ANGLED PARKING
• STREET TREES AND WIDEN SIDE WALKS
• WIDENED SIDE WALK ON EAST SIDE OF STREET ALLOWS FOR COMMERCIAL AND RESTAURANT ACTIVITIES TO SPILL INTO STREET FOR ADDED COLOR
MISSION STREET
HOWARD STREET
PROMENADE/NEWS PAPER KIOSK
ADD RETAIL USES TO GROUND FLOOR OF PARKING GARAGE TO ESTABLISH UNBROKEN LINE OF ACTIVITY FROM MISSION STREET TO HARRISON.
HOWARD STREET
• RE ALIGN HOWARD FOR 90° INTERSECTION – DRAMATIC LINE OF SIGHT INTO PARK FRAMED BY PROMENADE COLUMNS AND BLVD STREET TREES.
HOTEL/HOUSING BLOCK ARCADE ON EMB. BLVD SIDE AND ACKNOWLEDGE HILLS PLAZA CONNECTION TO FOLSOM STREET
FOLSOM STREET
HILLS PLAZA
SPEAR STREET
HARRISON STREET
FAIRBANKS JOSEPH MAGNIN WAREHOUSE
PRESERVE VIEW TO PIER 24 PLAZA PAVING & STREETLIGHTS BASED FOR BULKHEAD
HATHAWAYS WAREHOUSE
BAY BRIDGE
SPEAR ST CLOSED - TREES AND PLAZAS EXTEND BLVD TREATMENT INTO INDUST. COMM ENVIRONMENT
2 BRYANT STREET
MAINTAIN VISUAL LINE FROM BRYANT ST TO PIER 28
MAIN STREET
BRYANT STREET

FIGURE 3.4-2
EMBARCADERO PARKWAY PROJECT DESIGN

MUNI Metro Extension to Mission Bay. As stated in Section 1.3.4, the MUNI Metro Extension is scheduled to provide service starting in 1993 from the proposed MUNI Metro Turnaround Project south and west to a terminus within the proposed Mission Bay project area near Fifth and Townsend Streets (see Figure 3.4-3). Four stops would be incorporated into the line extension. The probable locations for the stops are listed below:

- Hills Plaza/Rincon Hill
- Brannan/Embarcadero
- Second/King Streets
- Fourth/King Streets

The MUNI Metro Extension into Mission Bay is called for in a number of planning and policy documents. They include: the SCR 74 Study; the I-280 Transfer Concept Program; the Transportation Element of the Master Plan of the City and County of San Francisco; the Downtown Plan; the Draft Mission Bay Master Plan; and finally the Memorandum of Understanding between Santa Fe Pacific Realty Corporation and the City and County of San Francisco.

The Extension would eliminate the need for the 32-Embarcadero and 80X-Gateway Express routes, and would offer other opportunities for more efficient deployment of MUNI's local transit services in conjunction with land use development in the Central Waterfront Area, as described in the Draft Master Plan for Mission Bay.

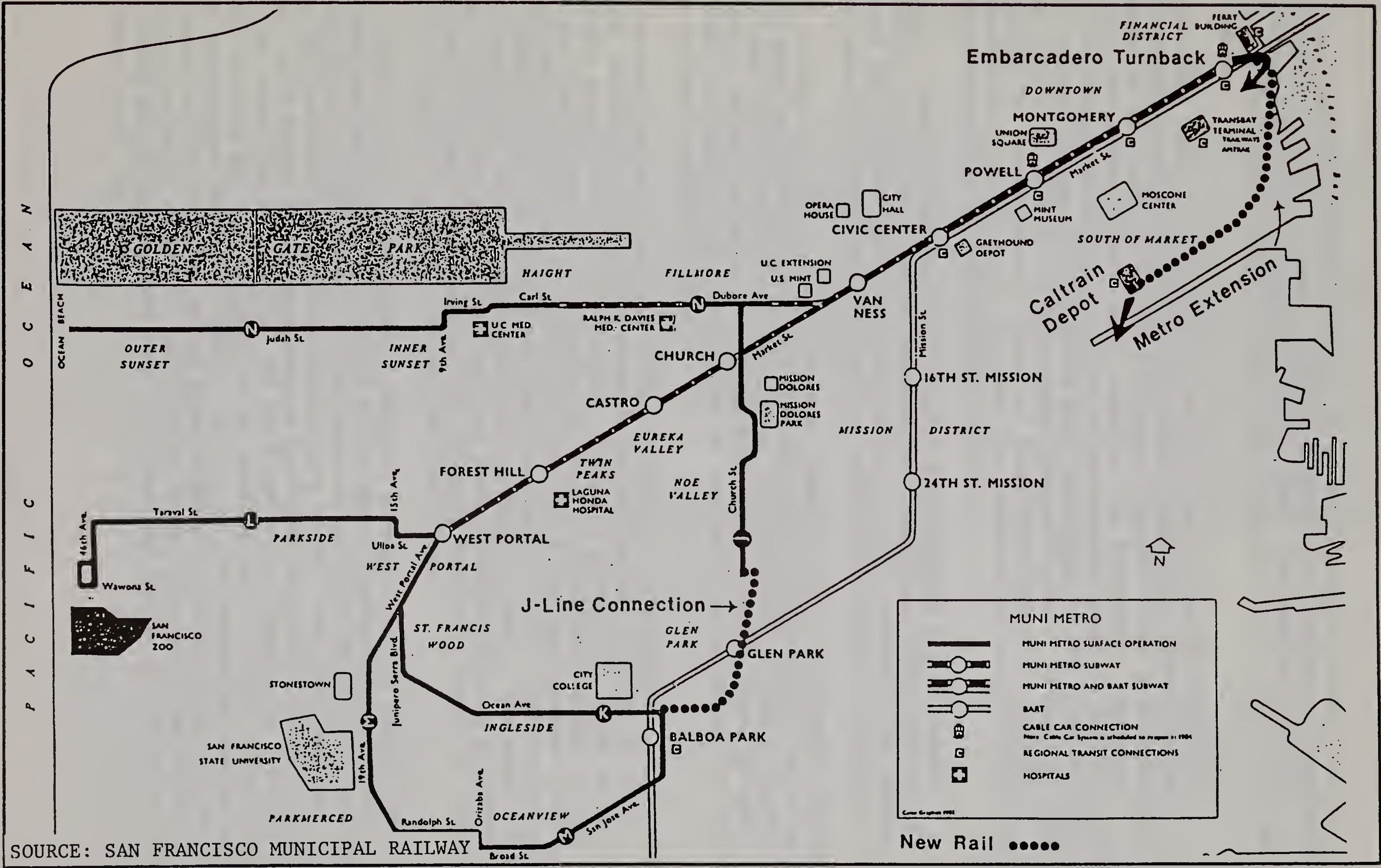
The proposed project includes the following elements:

- An at grade, double track exclusive transitway from the MUNI Metro Turnaround Project surface track to Sixth and King within the Mission Bay project area. The trackway would follow along an alignment in the median of a rebuilt Embarcadero Boulevard and continue within the median of King Street rebuilt as a boulevard leading to and from new I-280 on- and off-ramps.

- Four additional at grade stations within the Embarcadero Parkway and King Boulevard median, including a high capacity intermodal station adjacent to a Peninsula Commute Service station in Mission Bay.

The Metro Extension would provide improved, direct local transit service between the City's neighborhoods and downtown area and three areas of substantial proposed new development: Rincon Hill, South Beach, and Mission Bay. One transfer regional transit service with BART as well as a direct MUNI rail connection to the Peninsula Commute Service would be established. Finally, with the F-Market streetcar connection operating north of the Embarcadero Station, the Metro Extension would link the entire Northeastern Waterfront area with the Mission Bay development and the Peninsula Commute Service as well. It is envisioned that the Metro Extension would ultimately be continued south into the Mission Bay project area and beyond.

The I-280 Transfer Concept Program Study forecasts in excess of 20,000 daily transit trips by the year 2000 on the Extension. The opportunity exists to plan the Extension to assure that it will be incorporated into the City's land use planning in a highly compatible and mutually supportive manner.


Embarcadero Turnback
FINANCIAL DISTRICT
FERRY BUILDING
DOWNTOWN
MONTGOMERY
UNION SQUARE
POWELL
TRANSBAY TERMINAL
TRAILWAYS
AMTRAK
MOSCONE CENTER
MINT MUSEUM
Market St.
CIVIC CENTER
OPERA HOUSE
CITY HALL
GREYHOUND DEPOT
SOUTH OF MARKET
Caltrain Depot
Metro Extension
VAN NESS
U.C. EXTENSION
U.S. MINT
FILLMORE
HAIGHT
GOLDEN GATE PARK
Irving St.
Carl St.
Dubore Ave
RALPH K. DAVIES MED. CENTER
U.C. MED. CENTER
OCEAN BEACH
Judah St.
OUTER SUNSET
INNER SUNSET
9th Ave.
CHURCH
Mission St.
16TH ST. MISSION
MISSION DOLORES
MISSION DOLORES PARK
MISSION
DISTRICT
CASTRO
EUREKA VALLEY
24TH ST. MISSION
FOREST HILL
TWIN PEAKS
NOE VALLEY
Church St.
LAGUNA HONDA HOSPITAL
15th Ave.
Taraval St.
46th Ave.
PARKSIDE
Ulloa St.
WEST PORTAL
WEST PORTAL
West Portal Ave
Wawona St.
SAN FRANCISCO ZOO
J-Line Connection
ST. FRANCIS WOOD
GLEN PARK
GLEN PARK
N
CITY COLLEGE
STONESTOWN
Junipero Serra Blvd.
Ocean Ave
INGLESIDE
BALBOA PARK
SAN FRANCISCO STATE UNIVERSITY
19th Ave.
Orizaba Ave.
PARKMERCED
Randolph St.
OCEANVIEW
San Jose Ave.
Broad St.
PACIFIC OCEAN
MUNI METRO
MUNI METRO SURFACE OPERATION
MUNI METRO SUBWAY
MUNI METRO AND BART SUBWAY
BART
CABLE CAR CONNECTION
REGIONAL TRANSIT CONNECTIONS
HOSPITALS
New Rail ●●●●●
SCALE

SOURCE: SAN FRANCISCO MUNICIPAL RAILWAY

FIGURE 3.4-3 MUNI METRO EXTENSION

The Downtown Plan EIR also examined intra- and inter-City transit ridership demands for the next 15 years. Ridership growth was forecast to increase by approximately 40 percent between 1985 and 2000. The Downtown Plan EIR presumed that much of the forecast office development will occur in the South of Market.

Engineering work for the Extension would be done by the PUC Utilities Engineering Bureau as a part of the overall Embarcadero Parkway Project managed by the Department of Public Works. The BART Board of Directors has already authorized $15 million to construct the Extension. Subsequent resolutions by the PUC and the Board of Supervisors (#142-87) accepted these BART monies. Alignment studies are being undertaken by the Department of Public Works as part of the Embarcadero Parkway Project. No Federal funds are expected for the Extension. Since the Turnaround Project has utility independent of the Extension proposed, its construction is not affected by the planning schedules for the Extension project.

F-line. Market Street has traditionally had intensive public transit services, historically focused on streetcar operations. Rail cars ran on Market for 122 years prior to their removal in 1980, making it the longest continuously operated rail service on a main street anywhere in America.

The decision was made to eliminate most transit services from Market Street in 1968 based on a design plan which envisioned the underground MUNI Metro as an upgraded replacement service. Therefore, the removal of streetcar tracks and boarding islands, along with shifting most surface transit (trolleys and buses) to Mission Street, was assumed by architects and engineers who laid out the original redesign plans.

Increasing ridership demand generated by downtown development together with other circulation constraints rendered impractical any proposal to route surface transit onto Mission Street. Community pressure to retain Market Street transit resulted in a series of local legislative reversals to the 1968 plan, culminating in a decision to provide for a four lane transit operation on Market Street including streetcars (Resolution 160-83). Renewed interest was stirred to retain streetcar service on Market Street in the summer of 1983 when an "Historic Trolley Festival" was held, operating antique streetcars between the Upper Market area and the Transbay Terminal. Community support for the project has grown over the last four years.

The benefits to be derived from a historic streetcar service along Market Street were significantly enhanced by the Board's concurrent 1983 policy resolution to integrate it with the proposed extension of streetcar service to the Northeastern Waterfront and Fisherman's Wharf. From this resolution, a continuous Market Street/Northeastern Waterfront streetcar service, called the F-line, would result. Further PUC and Board action (Resolution 1058-86) in 1986 approved the rail alignment to be extended west on Market Street between Van Ness Avenue and Castro Street. The F-line was proposed to have an outer terminal at Castro Street and an inner terminal in the Fisherman's Wharf area. The F-line would, therefore, serve Market Street from Castro to the Ferry Building and The Embarcadero north of Market and provide the following public transportation benefits:

- Improved surface transportation along Market Street and along the Northeastern Waterfront using rail equipment in lieu of the existing trolley and diesel coach service. The 8-Market and 32-Embarcadero lines would be eliminated in favor of the F-Market line's higher capacity and higher quality service.

- Some relief to the overcrowded cable car lines, as significant numbers of people are expected to divert from cable cars to enjoy the historic flavor of the F-Market streetcar line for trips between the Downtown and Fisherman's Wharf.

- Maintenance of surface Market Street rail service, which could be useful whenever scheduled or unscheduled maintenance of the Metro subway system occurs.

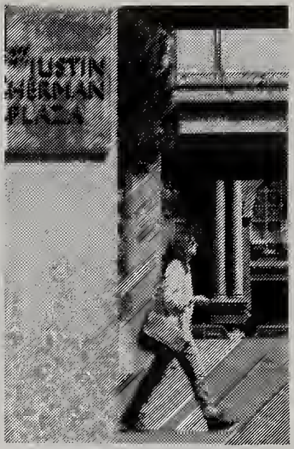
An Environmental Assessment (EA) for the F-line along Market Street is due to be published in late 1988. Discussion continues regarding the final alignment for the extension along The Embarcadero to Fisherman's Wharf. The EA will also evaluate route alignment and terminal location to the F-line extension.

Travel demand forecasts prepared for the I-280 Program EIR estimated that some 23,000 daily riders would use the F-line streetcar initially, with a capacity to absorb nearly twice as much. This compares with 20,000 daily riders presently using the 59-Powell-Mason Cable Car. Construction of the F-line, as part of the Market Street Transit Thoroughfare Project, began in May, 1988. The overall project schedule calls for construction on Market Street to be completed in 1992.

Peninsula Commute Service. The Peninsula Commute Service (PCS) serves the 47 mile West Bay transportation corridor from San Jose through Santa Clara and San Mateo Counties to San Francisco (see Figure 3.4-4). Currently, the PCS carries approximately 16,000 daily riders, primarily commuters, to the San Francisco terminus (Southern Pacific Depot) at Fourth and Townsend. Until 1980, this service was owned and operated by the Southern Pacific Transportation Company. Because of declining ridership and lack of profitability, Southern Pacific requested to abandon the commute service. The State of California intervened and, in July, 1980, the California Department of Transportation (CALTRANS) entered into a ten-year "Purchase of Service" agreement with the Southern Pacific Transportation Company. The objective of the agreement was for CALTRANS to take over the responsibility for, improve, and enhance the commuter rail service in order to attract additional riders. Under this agreement, the Southern Pacific Transportation Company continued to operate the service while the administrative and funding roles were performed by County and State governmental agencies.

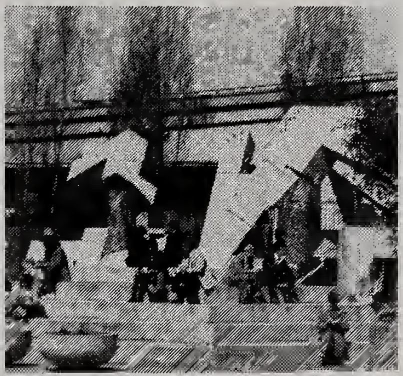
More recently, the State of California has indicated that it would withdraw its operating support for the Peninsula Commute Service when the agreement with Southern Pacific terminates in 1990. A Joint Powers Board (JPB), consisting of representatives from San Francisco, San Mateo, and Santa Clara Counties, has been charged with the responsibility to determine the operation and financing for PCS service after the State withdraws. A number of issues related to upgrading service are being examined as part of the JPB planning process. One of the primary issues involves terminal relocation in San Francisco. The existing station occupies land owned by the Santa Fe Pacific

Justin Herman Plaza One of the very few green areas, it was designed principally as a visual and physical access buffer to the Embarcadero roadway. The lack of convenient access points to the lawn area may contribute to low usage.

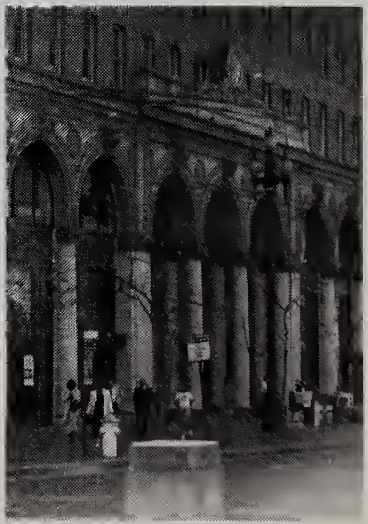


Justin Herman Plaza The network of pedestrian spaces and plazas provide relief, sunshine, space for exercise and a moment of quiet in a high-density urban environment. The urban design quality of this open space varies from the active crowd-oriented spaces of the plaza area to the quiet and softness of the somewhat under-utilized park area.

Justin Herman Plaza provides lunch-hour open space and recreation for downtown office workers.

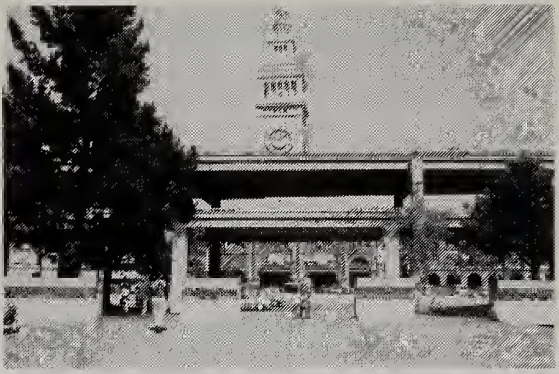


Vaillancourt Fountain (Justin Herman Plaza) This centerpiece of Justin Herman Plaza seeks to provide a visual focus for the plaza. Its non-traditional design was very controversial when installed in 1971.



Southern Pacific Building This historic building is the centerpiece of the One Market Plaza development. Southern Pacific is an architectural triumph of the Beaux-Arts tradition. The Renaissance and Baroque ornamentation of the Southern Pacific Building is a superb urban design feature visible from Market Street, Justin Herman Plaza, the Ferry Building, and The Embarcadero.

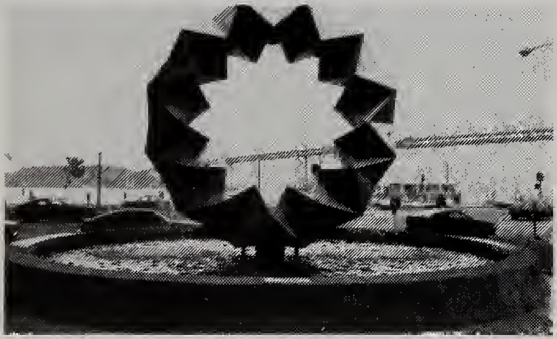
FIGURE 3.5-1



Ferry Building/Justin Herman/Market Street Interface The Ferry Building is spatially isolated from downtown by the Embarcadero Freeway. Normally, pedestrians must wait through two light signal changes to cross the entire Embarcadero roadway and parking areas in the middle.

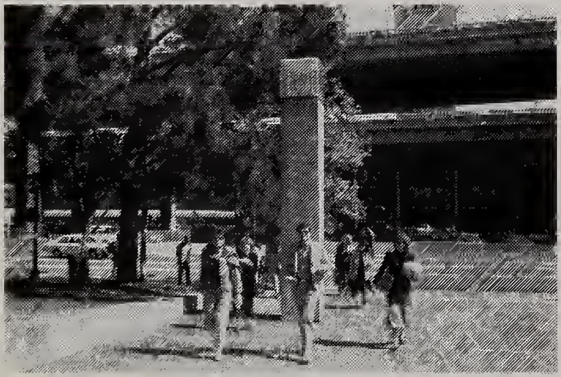
Justin Herman Plaza South of Market This grassy park area is picturesque but under utilized. Mounding of planting area is a buffer for physical access and views of the surface roadway and the elevated freeway.

Agriculture Building Beyond the Embarcadero Freeway, the visual access and character of the waterfront improves dramatically.



Bayside Plaza Urban amenities, such as this fountain and open space at Bayside Plaza, Howard and the Embarcadero, enliven and enrich a difficult space, especially in the noontime sun. The active water sculpture, Aurora by Ruth Asawa, connects visually to the passive Bay waters, frames views of the Bay, and muffles the overhead freeway traffic noise. People do use this space against all odds.

Views Framed Many of the views along the waterfront are framed by the horizontal and vertical elements of the Embarcadero freeway structure. Many other views, however, are blocked by the freeway structure.



Market Street-Ferry Building Access Pedestrian access to the waterfront in the project area is undefined and difficult at key locations.

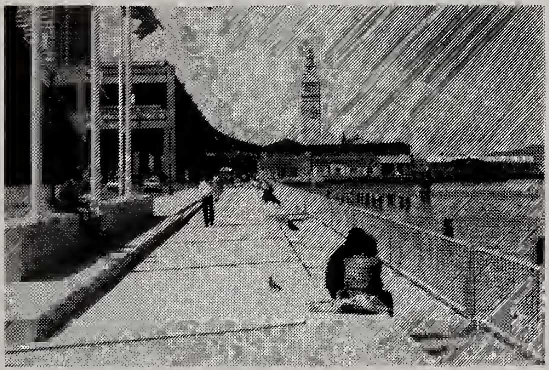
FIGURE 3.5-2

The Waterfront Promenade The most successful attempt in San Francisco to establish visual and physical access to the bayside waterfront.

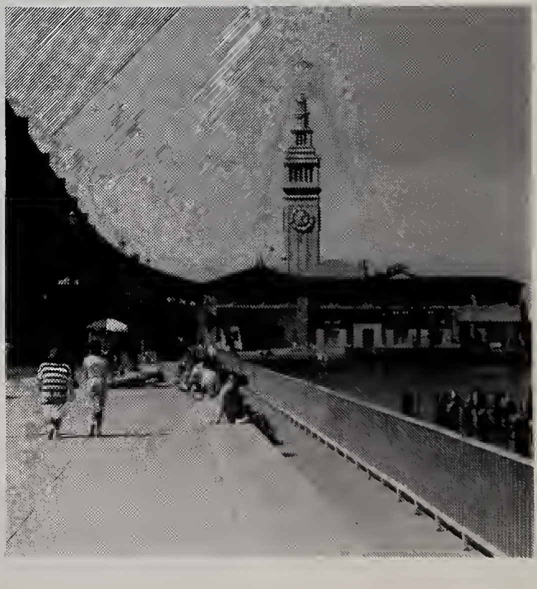
Visual Access Achieved The distinctive Embarcadero street lamps and the profile of the Bay Bridge define this scene as the San Francisco Embarcadero.

The Promenade Inspiring vistas, solitude, open space and sunshine are the main attractions of the water's edge away from the congestion, shadows and winds of downtown development.

The Waterfront Promenade Simple design elements defer to the Bay views and create visual and physical access to the waterfront.



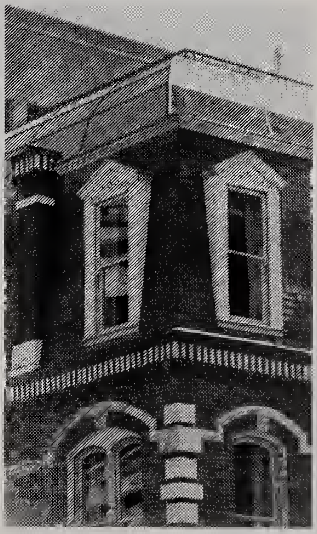
The Promenade From the Promenade, however, visual and physical access to downtown is blocked by the Embarcadero Freeway structure.

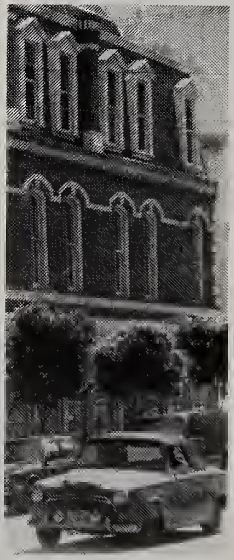


Ferry Building from the Promenade A classic urban waterfront setting featuring a long romantic vista with the sunlit clock tower of the Ferry Building is a visual asset established by the new waterfront Promenade. Water on one side and the city on the other make this vista a visual treasure. The freeway structure as a visual and physical obstruction separating the Ferry Building from the city is also well illustrated in this view from the Embarcadero Promenade.

FIGURE 3.5-3

San Francisco Ferry Building, Southern Pacific Building, Audiffred Building, Agriculture Building
The strong visual character of these Embarcadero landmark buildings helps to establish the character and historical significance of the area.





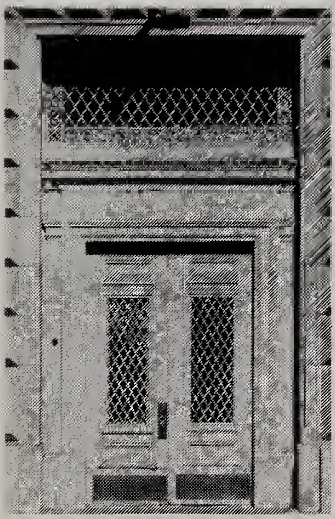
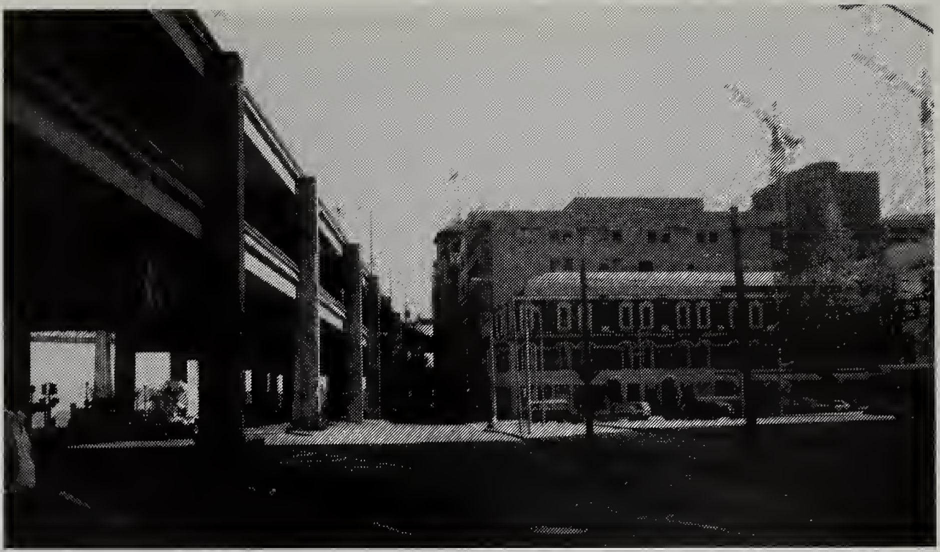
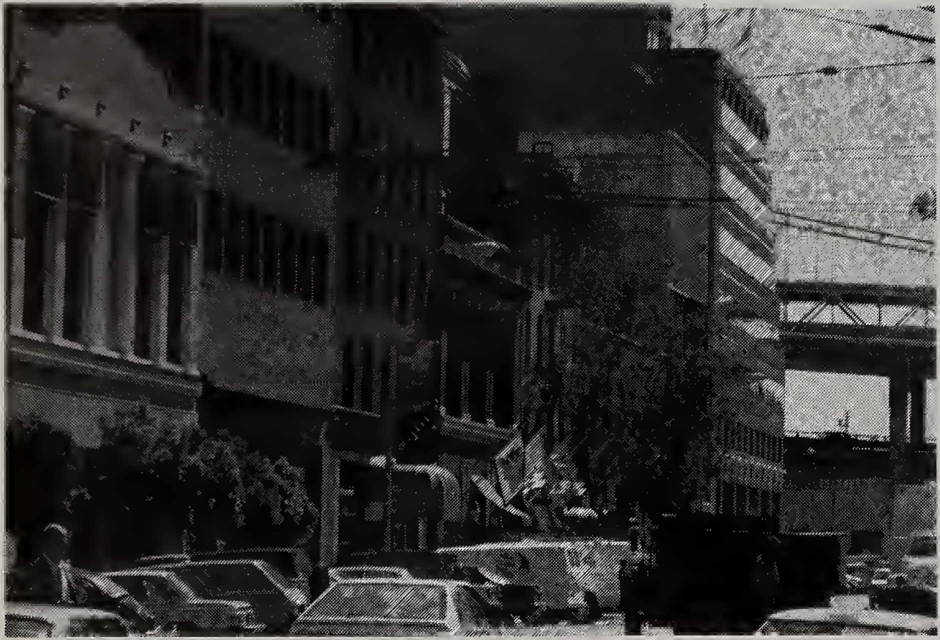


FIGURE 3.5-4

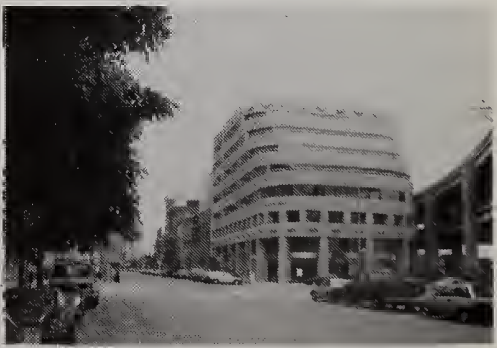


Encroachment of the Freeway viewed looking south from southbound lanes of the Embarcadero roadway. The abruptness of the city's edge at the freeway in its relationship to historic East Street Row.



East Street Row viewed looking south from Steuart Street. A unique blend of recent and historic buildings of a uniform scale at the water's edge, fosters a neighborhood feeling that provides character to the area. East Street Row offers a historic context to visualize San Francisco's nineteenth-century architectural history and downtown waterfront character.

The YMCA Building viewed from under the Embarcadero Freeway. The historic YMCA its special quality is often shadowed by the freeway.



Bayside Plaza Building A successful attempt to anchor and shelter the East Street Row historical buildings.

FIGURE 3.5-5

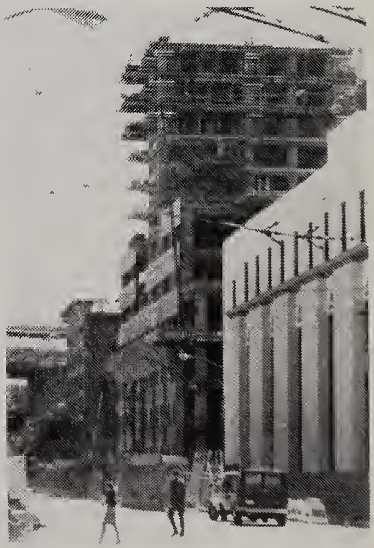
The Hills Brothers Coffee Building The Hills Brothers Coffee Building, a major waterfront visual landmark, will be preserved and redeveloped. A planned mid-block promenade through the Hills Brothers Coffee complex will connect the waterfront with planned Rincon Hill residential development. The development opportunities below Howard promise the kind of waterfront access downtown San Francisco is denied because of the Embarcadero Freeway.

Hills Plaza Archway Access portals to the waterfront. The city's Rincon Hill plan proposes a pedestrian corridor from a new Rincon Hill housing district which would flow through the archways of Hills Plaza to the waterfront edge.

·PIER·24·
RECREATION REST

Pier 24 Bulkhead An example of the waterfront's historic bulkheads.

South Beach Housing New South Beach high-density residential blocks focus on the waterfront, adjoining the Turnaround project area. Providing waterfront access, open space and recreation opportunities for this new residential neighborhood will be important amenities for this development.



Rincon Point Redevelopment viewed looking south from the MUNI Trolley Bus Turnaround. New commercial facilities will attract visitors to the waterfront area. The waterfront will provide recreational and open space amenities for residents and downtown workers and visitors.

FIGURE 3.5-6

the Embarcadero Center office buildings, one of the most successful redevelopment projects in the United States. Justin Herman Plaza includes a large central area with the Vallaincourt Fountain as its major design feature, and a smaller park grassy area below Market (see Figure 3.5-1). The pedestrian access to the Ferry Building separates these two parts of the plaza at Market Street (see Figure 3.5-2). A small stage area and cafe seating are features of the larger and more successful section of the Plaza. Street merchants and lunchtime office worker gatherings create an exciting urban scene during weekdays. Concerts and other performances at the stage area help to generate excitement and activity evenings and weekends. The landscaping of Justin Herman Plaza is designed to serve as a buffer against the Embarcadero Roadway and Freeway. This buffer is emphasized in the bermed grassy area below Market Street. Views are limited toward the waterfront at this location where buffering the freeway and roadway are emphasized. Justin Herman Plaza focuses attention away from the waterfront edge and inward towards the built environment of downtown. Justin Herman Plaza could be enlarged with realignment of the Embarcadero Roadway.

The Bayfront Promenade, however, seeks to maximize the visual and physical access to the bayside waterfront. The Promenade design seeks to link the downtown built environment with the open water and sky vistas of the San Francisco Bay. The Promenade provides seating areas for passive activities, and different levels for walking or running along the waterfront (see Figure 3.5-3). With its elegant use of simple design elements, including classic streetlights, seating areas, flag poles and steps to varied levels, the Promenade is very noticeable amidst the visual jumble of the waterfront. By means of this visual openness and clarity, the Promenade invites physical accessibility and rewards the visitor with simplicity and openness. A park extension of the Promenade, to be built immediately inland following the proposed realignment of the Embarcadero Roadway, will expand this bayside open space amenity.

A hard surface walkway along the South Beach Marina shoreline, immediately south of the study area, includes pedestrian access along a jetty at the south end of the marina and public fishing and restroom facilities. A five- to seven-acre park for predominantly soft surface public recreational use will be added inland of the South Beach Marina at a future date. Additional pedestrian access and open space are proposed for the South Beach Redevelopment area by the closure of streets to through traffic and other improvements.

HISTORICAL/ARCHITECTURAL FEATURES

The major structures in the Turnaround Project area of historical and cultural distinction are the Ferry Building, Hills Brothers Coffee, East Street Row, and the San Francisco-Oakland Bay Bridge. These manmade structures add visual character and distinction and provide an essential sense of place along the waterfront and for the entire City (see Figure 3.5-3).

The Ferry Building, with its alignment at the foot of Market Street, is a regional landmark clearly visible among the towering high-rises, and from the Bay and Twin Peaks ends of the Market Street corridor (see Figure 3.5-2). Planned interior renovations are expected to expand the Ferry Building's commercial spaces.

The Bay Bridge is perhaps the most dominant manmade structure in San Francisco. It is the visible destination or origin of all trans-Bay commuters. Its alignment in the City provides a major vista of the urban form of San Francisco. From Twin Peaks at night, the newly lighted structure is in contrast to the downtown built environment. Its design excellence enhances the Bay Bridge's symbolic importance to San Francisco. In the Turnaround Project study area, the bridge is the dominant manmade element. At a scale larger than the immediate area, it is visible from multiple perspectives and vistas. It is a region-wide transportation corridor and structure that floats high above the rest of the built environment of the study area, anchored to Rincon Hill structurally and providing the dominant visual image in the study area (see Figure 3.5-3).

By contrast, the East Street Row buildings generally appear to be historical relics of nineteenth-century downtown San Francisco (see Figure 3.5-4). Surrounded by the towers of One Market Plaza, Embarcadero Center and the elevated Embarcadero Freeeway structure, the East Street Row buildings provide a model of human scale buildings amid a high density office tower district. As an ensemble, these buildings demonstrate the scale and rich variety of San Francisco blocks up to World War II (see Figure 3.5-5). The new Bayside Plaza complex, on the southern end of the block, successfully maintains the scale and order of the older buidings in the Row (see Figure 3.5-5) and provides a suitable anchor for the block.

The Hills Brothers Coffee complex at Harrison and The Embarcadero is a block square and includes a brick office building with loading docks facing onto The Embarcadero and a brick arcade extending beyond the building to an area of the complex where a new office building is being constructed. The Hills facility, although no longer a coffee roasting factory, is an example of the warehouse and industrial facilities that characterized the San Francisco waterfront and South of Market for much of the City's history. A large and handsome structure, the Hills Brothers Coffee facility dominates the large waterfront open space below the Embarcadero Freeway and is a satisfying reminder of the industrial and processing history of the South of Market district (see Figure 3.5-6).

VIEWS

The clarity of connections between land and water contributes to the perception that the waterfront is readily available as a relief or counterpoint to the density of San Francisco's urban development. The opportunity to view water contributes to the perceived accessibility of the water's edge. Visual access to water and water-related activity may be as important as physical access to the water. Views of ship masts, bridges, piers and bulkheads, and related sounds such as ship and fog horns help maintain and enhance a sense of the waterfront. Various north-south streets offer open views to the Bay. The elevated Bay Bridge and Embarcadero Freeway afford travelers the views of the City, the waterfront, and the Ferry Building. Waterfront views can be seen from points inland of the Embarcadero Freeway. However, from many parts of the City's Financial District, the Embarcadero Freeway and densely grouped highrise buildings block pedestrian level views to the waterfront area.

CONCLUSION

The project plans for South Beach Redevelopment area housing blocks, the Rincon Point highrise housing, and the City's proposal for a highrise housing district on Rincon Hill, all specify enhancement of visual and physical access to the waterfront to provide recreational and open space facilities for the residents of these new residential neighborhoods. Further, the City's Embarcadero Parkway and Turnaround Project Plans also seek to maximize visual and physical access to the waterfront. The goal of all development plans in the Turnaround Project area is to relate these urban design elements in a coordinated program to enhance visual character and waterfront access. The Turnaround study area between Howard and Brannan, presenting essentially an empty stage, provides the best opportunity along the San Francisco bayfront, to coordinate public planning and expenditures to achieve a cohesive visual and physical connection between the waterfront natural areas and the new City districts and facilities being developed.

North of Howard, the assembled urban waterfront environment, including the elevated Embarcadero Freeway, can be expected to remain in place for the indefinite future. South of Howard, a new roadway alignment, the Turnaround Project facility, new open spaces, and residential neighborhood developments will create a new and more accessible waterfront district in San Francisco during the next ten years. The special location of the Turnaround Project gives particular significance to the need for sensitive urban design treatment of the Turnaround Project facilities in conjunction with The Embarcadero Parkway Project. (See Section 4.5, "Urban Design," for discussion of urban design impacts and mitigation measures.)

3.6 AIR QUALITY

3.6.1 RELEVANT POLLUTANTS

The MUNI Metro Turnaround Project is located in the central portion of the San Francisco Bay Area Air Basin. The San Francisco Bay Area Air Basin is designated, under provisions of the 1977 Clean Air Act, as a nonattainment area for two pollutants, ozone (O3) and carbon monoxide (CO). Nonattainment refers to those areas that, by virtue of their air pollution trends, violate one or more of the National Ambient Air Quality Standards (NAAQS). The Bay Area Air Quality Management District (BAAQMD) monitors the concentration of pollutants at 24 sites within the Bay Area Air Basin. The nearest monitoring site is approximately three miles from the project area. These data indicate that infrequent violations of the NAAQS for oxidant, CO and TSP have occurred within the City of San Francisco in the last six years.

TRANSPORTATION RELATED POLLUTANTS

A summary of existing emissions from mobile and stationary sources in San Francisco is presented in Table 3.6-1. These data indicate that mobile sources (i.e., motor vehicles) account for a large portion of the CO, hydrocarbons, nitrogen oxide and particulate emissions in the City. It is the chemical reaction of hydrocarbons with nitrogen oxides, in the presence of sunlight, that produces photochemical oxidants, primarily ozone.

The two most important traffic parameters affecting transportation related pollutants are total vehicle miles of travel (VMT) and average operating speed. A reduction in VMT and/or an increase in operating speeds (especially during peak commute periods) can result in reduced emissions of hydrocarbons, which combine with oxygen to produce CO and ozone in the atmosphere (although NOx emissions increase with increased operating speeds due to increased fuel consumption). Reduced operating speeds are currently characteristic of several congested roadways which carry large peak hour volumes in the vicinity of the MUNI Metro Turnaround project area.

As stated earlier, the BAAQMD monitoring stations in San Francisco have recorded very few violations of air pollution standards over the previous five years. Even with the large volumes of traffic in the vicinity of the project area, San Francisco had only one violation for 1987. Additionally, no violations of the lead standard occurred in the County of San Francisco for the year 1986. The State standard is 1.5 micrograms per cubic meter for a 30 day average. The BAAQMD monitoring stations in San Francisco reported monthly averages ranging from 0.23 to 0.05 micrograms per cubic meter for 1986. This is well below the State standard.

The most significant pollutant due to operational emissions, at the local level, is carbon monoxide. Table 3.6-2 summarizes the existing CO concentrations due to the average daily traffic (ADT) and due to the peak hour traffic on several streets in the proposed project area. The existing CO concentrations were calculated using a simple, low traffic volume dispersion model from the BAAQMD's Guidelines for Assessing Impacts of Projects and Plans (1985). The total carbon monoxide concentration at street level is the sum of the concentration due to vehicle emissions and the background concentration. The background eight hour carbon monoxide concentration, obtained from BAAQMD

TABLE 3.6-1. EMISSION RATES FOR SAN FRANCISCO (TONS PER DAY)

POLLUTANT • SOURCE TYPE	INVENTORY YEAR 1982	 1983
Carbon Monoxide (CO)		
• Mobile	251	221
• Stationary	24	28
• All	275	250
Hydrocarbon (Hc)		
• Mobile	27	31
• Stationary	30	27
• All	57	58
Nitrogen Oxides (NOx)		
• Mobile	29	29
• Stationary	35	13
• All	64	42
Sulfur Oxides (SOx)		
• Mobile	8	12
• Stationary	3	1
• All	11	13
Particulates (TSP)		
• Mobile	24	42
• Stationary	28	24
• All	52	66

Source: BAAQMD, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, 1985.

TABLE 3.6-2. EXISTING 1987 TOTAL CONCENTRATIONS FOR CARBON MONOXIDE

STREET	CROSS STREETS	ADT	PEAK HOUR	CO 8 HOUR(a)	CO 1 HOUR(a)
Embarcadero	Folsom & Howard	13,064	1,300 (b)	10.5 ppm	15.0 ppm
Embarcadero	Brannan	21,764	2,384	14.4 ppm	20.6 ppm
Embarcadero	Market & Mission	21,376	2,470	14.4 ppm	21.1 ppm
Steuart	Howard & Folsom	2,147	240	6.8 ppm	9.8 ppm
Steuart	Market & Mission	3,863	297	7.1 ppm	10.1 ppm
Spear	Mission & Howard	5,299	499	7.9 ppm	11.3 ppm
Spear	Howard & Folsom	4,065	410 (est.)	7.5 ppm	10.8 ppm

Assuming 15 mph average speed and 1987 CO emission factor, 43.39 grams/mile.

ppm: parts per million.

(a) Includes background concentrations.

(b) Peak hour estimates based on 10 percent of ADT.

Traffic Figures Source: San Francisco Public Works Department, Traffic Engineering Department

Source: Earth Metrics Incorporated, 1988.

isopleths for 1987, is 5.8 ppm while the background one hour CO concentration is 8.3 ppm. An isopleth is a graph showing the occurance or frequency of any phenomena as a function of two variables, in this case location and concentration of CO.

The State standards for carbon monoxide concentrations are 9.0 ppm for the eight hour averaging period and 20 ppm for the one hour averaging period. The calculations in Table 3.6-2 suggest that CO levels along The Embarcadero between Market and Howard may be in excess of this standard. Actual site monitoring would be needed to verify this assumption.

The peak hour traffic figure for Steuart Street between Market and Mission Streets, listed in Table 3.6-2, may include trolley bus traffic. Hence the calculated values for the existing total carbon monoxide concentrations for this section of Steuart Street may be slightly elevated.

The sensitive receptors that are exposed to these street level concentrations include users of Justin Herman Plaza and Bayfront Promenade. Additionally, considerable pedestrian traffic in the vicinity of the project site occurs throughout the day.

3.6.2 REGIONAL COMPLIANCE WITH STANDARDS

The Association of Bay Area Governments, Metropolitan Transportation Commission, and Bay Area Air Quality Management District have submitted an attainment plan to the California Air Resources Board to respond to the nonattainment status of the San Francisco Bay Area Air Basin. Although, based on readings from the City's monitoring sites, the City of San Francisco is in compliance with State and Federal standards, the Bay Area region (San Francisco Bay Area Air Basin) is not.

STATE IMPLEMENTATION PLAN

The California Air Resources Board, coordinating agency for State subregional attainment plans, in turn, submitted the California State Implementation Plan (SIP) to the U.S. Environmental Protection Agency. The purpose of air quality attainment planning was to identify and implement control measures adequate to meet the National Ambient Air Quality Standards by 1987, the extended target date legislated in the Clean Air Act Amendments of 1977. Measures to reduce hydrocarbons (ozone precursors) and carbon monoxide emissions were included in the SIP for stationary sources and motor vehicles. Biennial inspection and maintenance of motor vehicle emission control equipment was recently added to the SIP.

Although substantial air quality improvements have been realized for both ozone and CO, the San Francisco Bay Area Air Basin did not meet the 1987 attainment deadline. Congress is considering several bills amending the Clean Air Act that deal with the nonattainment issues.

3.7 NOISE AND VIBRATION

3.7.1 EXISTING NOISE AND VIBRATION SOURCES

Noise sources affecting the project area include vehicle traffic on the Embarcadero, the James Lick Skyway and the Bay Bridge. Vehicle traffic on roads leading into and terminating in the project area, including Steuart, Spear, Market, Mission, Howard, Folsom, Harrison, and Bryant Streets also contribute as noise sources. An on-site inspection did not reveal any strong vibration sources above ground. Construction activities presently occurring in the project area may also contribute to the existing sound levels. Sensitive receptors in the area include the Justin Herman Plaza along Steuart Street near the Ferry Building and the Hills Plaza Project between Folsom and Harrison Streets.

3.7.2 EXISTING NOISE LEVELS AND RECEPTORS

To quantify the existing sound levels in the project area, six 30 minute noise measurements were taken at the following locations and times:

1) near the corner of Market and Steuart (office building land use), 11:05 to 11:35 A.M.;

2) near the corner of Mission and Embarcadero (park land use), 11:51 A.M. to 12:21 P.M.;

3) near the corner of Howard and Embarcadero (park land use), 12:35 to 1:05 P.M.;

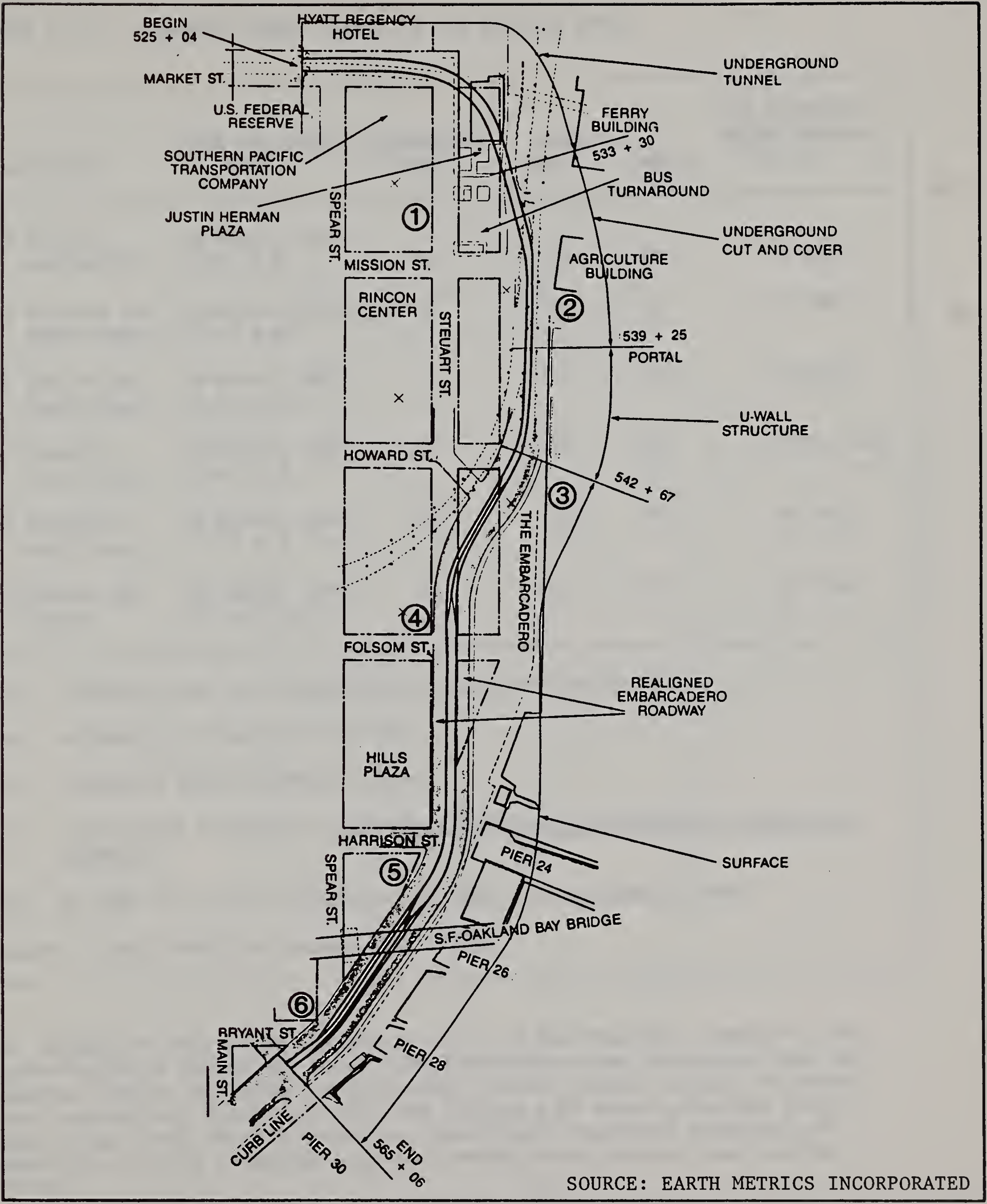
4) near the corner of Folsom and Steuart (commercial land use), 10:44 to 11:14 A.M.

5) near the intersection of Harrison and Steuart with Embarcadero (office building and residential land use), 11:27 to 11:57 A.M.; and

6) near the intersection of Spear and Bryant with Embarcadero (office building land use), 12:10 to 12:40 P.M.

These locations were chosen so as to be along major streets, to be near any sensitive receptors in the project area, and to represent a variety of land uses. The sensitive receptors include the Hills Plaza residential and commercial complex near measurement locations 4 and 5, the Justin Herman Plaza near measurement location 1, and the Bayfront Promenade near locations 2 and 3. The measurement locations are shown in Figure 3.7-1. The measurement data were obtained in the form of the Leq noise scale. Leq is the equivalent steady state sound level which contains the same acoustic energy as the varying sound level over the measuring period.

The instrument used for the noise measurements was a Bruel & Kjaer Precision Integrating Sound Level Meter Type 2230. The instrument continuously averages the varying sound pressure levels over the period of monitoring. Calibration was performed before the sampling utilizing a Bruel & Kjaer Calibrator Type 4230. The monitoring results are presented in Table 3.7-1.


BEGIN
525 + 04
HYATT REGENCY HOTEL
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
SPEAR ST.
①
MISSION ST.
UNDERGROUND TUNNEL
FERRY BUILDING
533 + 30
BUS TURNAROUND
UNDERGROUND CUT AND COVER
AGRICULTURE BUILDING
②
539 + 25
PORTAL
RINCON CENTER
STEUART ST.
U-WALL STRUCTURE
HOWARD ST.
542 + 67
③
THE EMBARCADERO
④
FOLSOM ST.
REALIGNED EMBARCADERO ROADWAY
HILLS PLAZA
SURFACE
HARRISON ST.
PIER 24
⑤
SPEAR ST.
S.F.-OAKLAND BAY BRIDGE
PIER 26
⑥
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30
END
565 + 06

SOURCE: EARTH METRICS INCORPORATED

SCALE

FIGURE 3.7-1 SOUND MEASUREMENT LOCATIONS

TABLE 3.7-1. MEASURED SOUND LEVELS IN THE PROJECT AREA

LOCATION	DATE AND START TIME	DISTANCE(a) FEET	Leq(b) dBA	CNEL(c)	SAN FRANCISCO NOISE STANDARD (d)(e)
1) Steuart and Market	25 March, 1988 11:05 A.M.	10	70	72	70 CNEL
2) Mission and Embarcadero	25 March, 1988 11:51 A.M.	30	77	79	70 CNEL
3) Howard and Embarcadero	25 March, 1988 12:35 P.M.	6	74	76	70 CNEL
4) Steuart and Folsom	29 March, 1988 10:44 A.M.	20	69	71	70/60 CNEL
5) Harrison and Steuart	29 March, 1988 11:27 A.M.	30	73	75	70 CNEL
6) Bryant and Spear	29 March, 1988 12:10 P.M.	15	73	75	70 CNEL

(a) Distance from the center line of the near traffic lane.

(b) Adjusted for peak hour levels.

(c) Community Noise Equivalent Level.

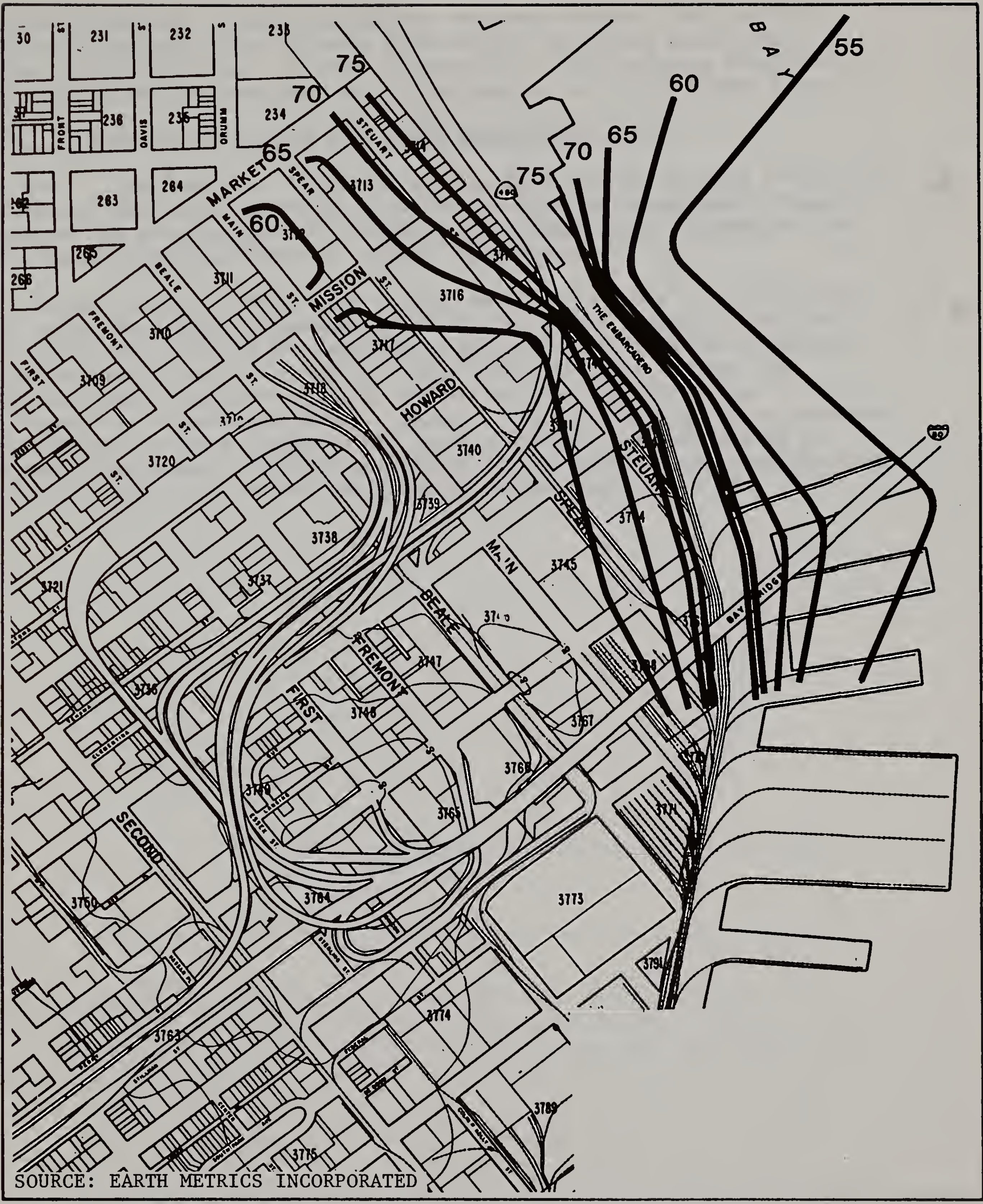
(d) City of San Francisco, Comprehensive Plan, Environmental Protection Element.

(e) 70 CNEL for office buildings, 60 CNEL for residential uses.

Source: Earth Metrics Incorporated, 1988.

For purpose of evaluation against the City of San Francisco standards, the Community Noise Equivalent Level (CNEL) descriptor was calculated from the measured Leqs in accordance with typical diurnal traffic trends and sound level statistical distributions. The CNEL is a 24 hour equivalent energy sound level (Leq) which accounts for the greater annoyance potential of nighttime noise by weighting nighttime sound levels greater than daytime levels.

Sound level contours in terms of the CNEL were developed from the measurement data and are shown in Figure 3.7-2.


55
60
65
70
75
BAY
MARKET
MISSION
HOWARD
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
SECOND
THE EMBARCADERO
BAY BRIDGE
FRONT
DAVIS
DRUMM
3713
3712
3711
3710
3709
3716
3717
3740
3738
3739
3737
3745
3747
3748
3767
3766
3765
3764
3773
3774
3775
3763
3760
3720
3721
3736
3771
3789
3794
231
232
233
234
235
236
263
264
265
266

SOURCE: EARTH METRICS INCORPORATED

N

SCALE

FIGURE 3.7-2 EXISTING SOUND LEVEL CONTOURS IN CNEL

Sensitive receptors in the area include the Justin Herman Plaza and the Bayfront Promenade. Both of these areas support increased pedestrian traffic during the midday hours. As shown in Table 3.7-1, the existing sound level is approximately 69 dBA peak hour Leq in the area of the Justin Herman Plaza.

3.7.3 NOISE STANDARDS AND EVALUATION OF EXISTING LEVELS

The City of San Francisco Comprehensive Plan Environmental Element (1973) has identified sound level criteria for different land use categories. These standards are generally similar to the State of California recommended land use compatibility guidelines for similar land uses.

A comparison of the existing CNEL values, as shown in Table 3.7-1, with the City of San Francisco recommended compatibility levels indicates that the existing noise levels at the residential and office building sound receptors are in excess of the "satisfactory" range (above 70 CNEL; see the "SAN FRANCISCO NOISE STANDARD" column of the table, from page 19 of the Environmental Protection Element). However, the San Francisco Noise Ordinance does not include these standards nor contain specific absolute limits on ambient noise levels. The Ordinance has a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by 5 dBA.

3.8 ENERGY

3.8.1 REGIONAL ENERGY DEMAND

The energy setting of California and the nation is a critical one of increasingly higher energy costs and depleting nonrenewable energy supplies. The energy problem is compounded by growth and increasing demand for energy resources. State and Federal policy seeks resolution through energy conservation and development of alternate energy sources. Specifically, Powerplant and Industrial Fuel Use Act of 1979 and Executive Order 12185, Conservation of Petroleum and Natural Gas, require Federal agencies which administer programs of financial assistance to take actions which maximize the efficient use of energy and conserve natural gas and petroleum in programs funded by those agencies. The degree of success or failure in energy consumption depends on coordinating local and regional policies and fostering public awareness. Federal funding for programs in these areas has been reduced considerably during the current administration.

Table 3.8-1 presents the statewide electricity sales for the 12 month period ending in December for the years 1982 through 1987 as reported to the California Energy Commission by the five major utility companies of California. Although electricity sales leveled off during 1986, statewide electricity consumption is expected to increase due to population growth, additional agricultural need, particularly water pumping, and industrial expansion.

TABLE 3.8-1. STATEWIDE ELECTRICITY SALES (12 MONTH ENDED THROUGH DECEMBER, BILLIONS OF KILOWATT HOURS)

1982	1983	1984	1985	1986
145.0	146.7	156.0	159.0	159.0

Source: Energy Watch, California Energy Commission, 1983-1987

3.8.2 LOCAL SETTING

The MUNI Metro system electrical requirements are supplied by the Hetch Hetchy Project. The Tuolumne River watershed supplies the water resources for the Kirkwood, Holme, and Moccasin hydroelectric generation stations of the Hetch Hetchy system. The electricity is "dumped" onto the Pacific Gas and Electric Company's (PG&E) transmission lines at Newark and is wheeled across the Bay to MUNI Metro substations. The substations transform the electricity from 12,000 volts AC to 600 volts DC, which meets the operational energy requirements of the light rail vehicles. By metering the amount of electricity that the Hetch Hetchy system supplies at Newark and by metering the amount of electricity that the MUNI Metro substations draw from the PG&E transmission lines, the energy consumption of the MUNI Metro system can be directly related to Hetch Hetchy production.

3.8.3 MUNI METRO ENERGY REQUIREMENTS

Table 3.8-2 presents the energy consumption information for the San Francisco Municipal Railway for the year ending December 1983. The table shows energy consumption by mode and by energy source, number of revenue vehicles, and revenue vehicle miles.

The category Streetcar (SC) represents the energy consumption required by daily operation of the MUNI Metro light rail system. Streetcars have only been operated as historic vehicles along Market Street and on The Embarcadero from the Ferry Building to Fisherman's Wharf during the summer months.

TABLE 3.8-2. MUNI ENERGY CONSUMPTION, 1983

MODE	MB	SC (a)	TB	CC
Number of Revenue Vehicles	526	140	345	41
Gallons of Diesel Fuel (Thousands)	5086.9	-	-	-
Kilowatt Hrs. of Electricity (Millions)	-	49.8	23.4	1.4
Revenue Miles (Millions)	19.1	6.7	8.7	0.9

MB = Motorbus
SC = Streetcar or Light Rail
TB = Trolleybus
CC = Cable Car

Source: National Urban Mass Transportation Statistics, U.S. Department of Transportation, 1984

(a) The vast majority of MUNI vehicles in this category are Light Rail.

3.8.4 ENERGY REQUIREMENTS FOR EXISTING BUS SERVICE IN THE PROJECT AREA

The fraction of the revenue vehicle miles traveled in the project area is insignificant when compared to the total number of revenue vehicle miles for the entire MUNI system. Consequently, the energy requirements for existing bus service in the project area play a negligible role in forecasting energy impacts.

3.9 EXISTING STRUCTURES AND GEOTECHNICAL CONDITIONS

3.9.1 GEOLOGY AND SITE HISTORY

The alignment of the MUNI Metro Turnaround Facilities, from Market Street near Spear Street to Steuart Street near Folsom Street, is on reclaimed lands which were originally part of Yerba Buena Cove in San Francisco Bay. The original 1853 shoreline crossed Market Street near First Street, and Spear Street between Folsom and Harrison Streets. A map showing the location of the original shoreline in relation to the MUNI Turnaround Facilities is presented in Figure 3.9-1.

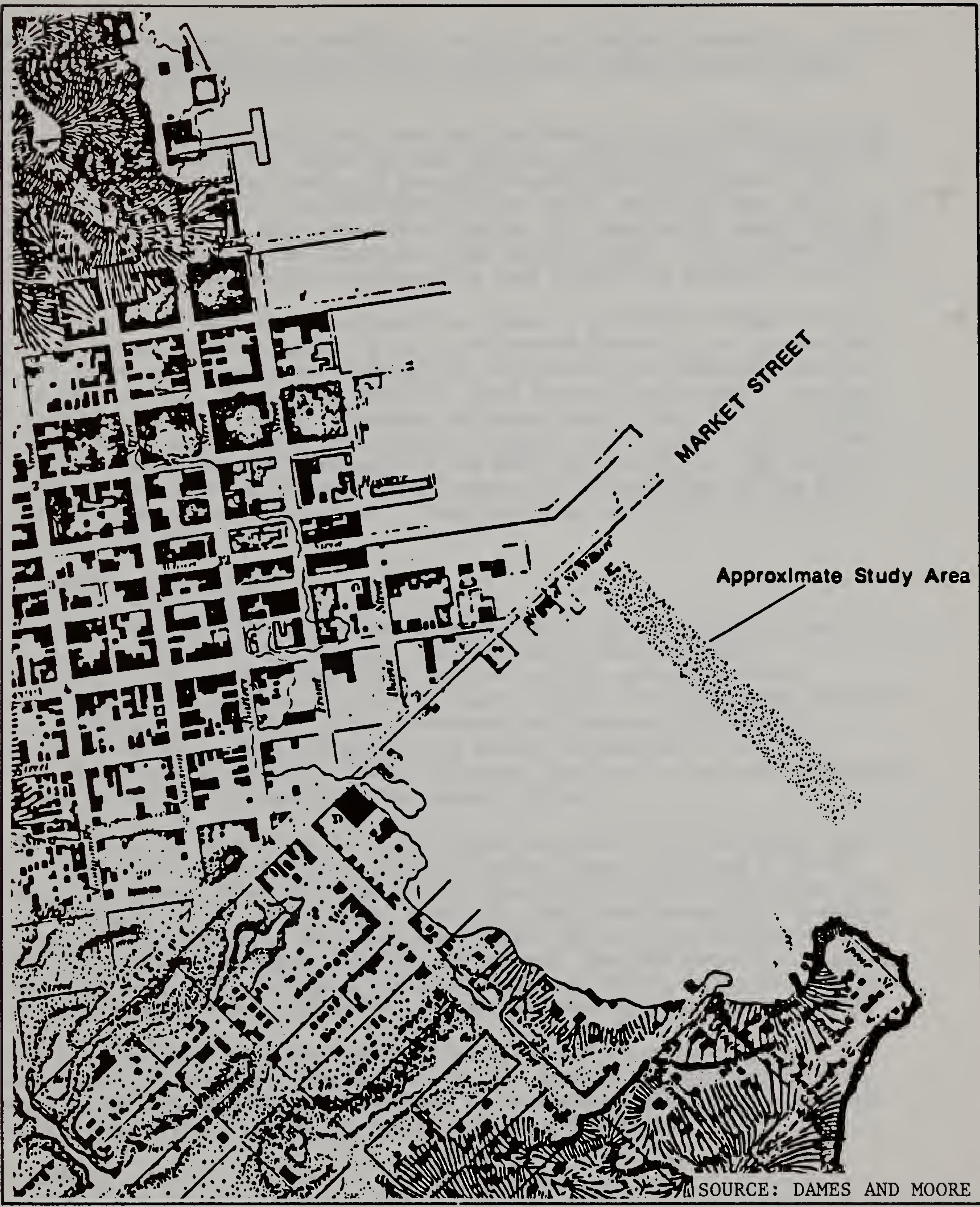
Because of the distances of various parts of the MUNI alignment from the old shoreline and from the nearest rock outcrop on Rincon Hill, subsurface conditions vary considerably along the alignment. The depth to bedrock below street grade ranges from a minimum of about 70 feet south of Howard Street on Steuart Street to a maximum of about 280 feet in the center of a rock valley along the Embarcadero between Market and Mission Streets. At the east end of the MUNI/BART Embarcadero Station, rock is also very deep, about 260 feet.

SUBSURFACE STRATA

Major subsurface strata underlie the MUNI Turnaround alignments between street grade and bedrock. Due to the greater than 200 foot difference in depth to rock, the thickness of these strata varies considerably and some of the deeper geologic sediments are missing where rock is less than 100 feet below surface. In increasing depth below street grade, these strata are:

- Fill including an old rock seawall;
- Recent Bay Mud primarily deposited in the last 7,000 years;
- Interbedded sands and clays deposited from 10,000 to 80,000 years ago;
- Old Bay Clays similar to the Recent Bay Mud but of greater shear strength and lesser compressibility, about 80,000 to 125,000 years old;
- Lower alluvial and colluvial sediments (probably less than 200,000 years old); and,
- Franciscan Bedrock of Upper Cretaceous to Jurassic Age (65 to 200 million years old).

The upper two strata, fill and Recent Bay Mud, are of much greater significance than the lower strata in the design and construction of the MUNI facilities. The fill materials consist primarily of loose to medium dense sand fills and rubble and vary from 15 to 40 feet in thickness. The old rock seawall is believed to be a maximum of 40 feet thick from crest to base and it is overlain by about 10 feet of sandy fill. The old seawall extends south of Market Street to within 50 feet of Howard Street. It is located westerly of the new seawall which currently defines the eastern limit of filled ground. Portions of both the underground and surface alignments will require excavations and pile driving into and through the old seawall. Approximate


MARKET STREET
Approximate Study Area
N
SCALE

SOURCE: DAMES AND MOORE

FIGURE 3.9-1 SAN FRANCISCO BAY SHORELINE AT MARKET STREET IN 1853

location of the seawalls and sampling sites for the geologic evaluation can be found in the Draft Factual Report Site Investigation MUNI Metro Turnaround Facility, Dames & Moore, 1985.

The Recent Bay Mud is a relatively weak and compressible silty clay with sand lenses which underlies the fills and rock seawall, where present. The Bay Mud controls the geotechnical design of the MUNI underground structures. The depth to the bottom of the Bay Mud below street grade increases from about 80 feet at the east end of the Embarcadero Station to a maximum of about 140 feet near the intersection of the Embarcadero and Howard Street. The minimum depth (about 60 feet) to the bottom of the mud is near Folsom and Steuart Streets.

Except for the cut and cover sections whose base is above the bottom of the old rock seawall (mainly between Mission and Howard Streets), the excavations for the turnaround tunnels and underground structures will generally bottom out in the Bay Mud. The deeper geologic units between the bottom of Bay Mud and bedrock consist of sandy and clayey sediments much firmer than the Recent Bay Mud. These deeper strata will provide significant support to piling used to underpin the Embarcadero Freeway and the MUNI box structures, but are not of major significance in evaluating the design and construction of the MUNI tunnels and underground structures. Therefore, they are not described in detail in this EIS.

SITE HISTORY (1848-1870)

Yerba Buena Cove saw very little development before 1848. During the Gold Rush period (1848 to 1853), the lower Market Street area had rapid development. A wharf was constructed on wood pilings along the future alignment of Market Street, as shown in Figure 3.9-1. The wharf area expanded rapidly with construction of piled structures and haphazard filling of adjacent water lots. Over 800 ships were moored or stranded in the Cove during the Gold Rush (Olmsted, 1977). In some locations, ships were abandoned in place and were encapsulated in the manmade fills.

Prior to the onset of intense landfill operations which reclaimed Yerba Buena Cove, the project area was under 12 to 30 feet of water. Filling of Yerba Buena Cove occurred after the City of San Francisco sold beach and water lots in 1847, 1850 and 1852 (Dow, 1973). The City also leased streets to investors willing to build wharves. Once the wharves were built, cross streets were built connecting the wharves. Fill in the general area consisted primarily of a dune sand with other materials including building rubble, trash and debris which was end dumped into the water from railway cars and horse drawn carts.

By 1870, Yerba Buena Cove was essentially filled and a new waterfront established. During this time period, the old seawall was extended to near Howard Street and wharves were developed or redeveloped along the waterfront. Fill was also being placed along Howard and Steuart Streets.

OLD SEAWALL

The Old Seawall, which underlies the Embarcadero Freeway in the MUNI project area, was completed by 1870. It was constructed by excavating a trench about 20 feet deep in the Recent Bay Mud, by dumping stone in the trench, and allowing the stone to settle to a "firm" foundation. The location of the old seawall is not known precisely, but it is expected to encroach on both the underground and surface alignments of the Turnaround Facilities.

NEW SEAWALL

The New Seawall was constructed in phases. A 1,000 foot segment from Pacific to Clay was completed by May, 1889. The first segment to be built south of Market, to the foot of Mission, was completed in June, 1890. The section from Folsom to Harrison was finished by May, 1915. Substantial amounts of rubble were incorporated into the new seawall, particularly after the 1906 earthquake and fire. The area between the old seawall and the new, together with the East Street right-of-way, is known as The Embarcadero. It was, and remains, the public part of the Port utilized for moving people and materials to and from the ships, piers and warehouses. The new seawall was completed approximately 75 years following the completion of the Eddy Survey of 1851 and the initiation of work on the old seawall.

SITE HISTORY (1870-1990)

From a geologic and geotechnical engineering standpoint, the site history since 1870 has not been as significant as the earlier years. Considerable settlement, estimated to be up to 10 feet, has occurred in the area of deeper fills and Bay Mud since the area was first filled. Debris from the buildings damaged by the 1868 and 1906 earthquakes was incorporated in the regrading and filling operations following the earthquakes.

3.9.2 GROUNDWATER

The fill material contains free-flowing groundwater. The top of this groundwater occurs at approximately 8 feet below ground surface in the vicinity of the Turnaround.

3.9.3 SEISMICITY/LIQUEFACTION POTENTIAL

San Francisco lies in a tectonically active region, where the North American and Pacific Plates come in contact. This contact region is characterized by northwest trending faults exhibiting mainly right lateral strike-slip movement; that is, the movement is predominantly horizontal with the western side of the fault moving northward with respect to the eastern side of the fault.

The major faults in the region include the San Andreas Fault, the Hayward Fault, and the Calaveras Fault. Several smaller faults occur in the immediate vicinity of the site, the nearest of which is the Seal Cove-San Gregorio Fault. The San Andreas and Hayward Faults are the most likely sources of strong motions.

From 1850 to the present, approximately 400 earthquakes with Richter magnitudes of 4.0 or greater have been reported within about 80 miles of the site. By far the most significant of these events was the April 18, 1906 earthquake with an estimated Richter magnitude of 8.3.

Strong motion earthquake records for the deep Bay Mud conditions present along the proposed MUNI project are very limited. Ground motions were recorded on the Southern Pacific Building at Market and Spear Streets for the 1969 Santa Rosa earthquake of magnitude 4.6, but the ground movements were minimal. Analyses indicate that maximum ground displacements for a 1906 type earthquake on the San Andreas Fault could be up to one foot.

Loose, fine to medium grained clean sands below the water table are particularly susceptible to seismic liquefaction; i.e., a partial to complete loss of strength could occur if the earthquake shaking is strong enough. For the MUNI alignments, the fills comprised primarily of dune sands at depths of 6 to 40 feet below ground surface are likely to liquefy under the design earthquake conditions. Liquefaction of the dune sand fills has been clearly demonstrated at many locations in Yerba Buena Cove. Prior to 1906, ground failures in the Yerba Buena Cove filled land were also observed at several locations due to the October 21, 1868 Hayward Earthquake (Youd and Hoose, 1978). The best documented evidence of liquefaction related failures under the MUNI alignment are those along The Embarcadero during the April 18, 1906, earthquake. Selected excerpts from Table 7 of Youd and Hoose (1978), which demonstrate the severity of ground motions in this area, are presented below:

> "Buildings on the water site, along East Street (now called The Embarcadero) generally slumped seaward, in some cases as much as 2 feet. The damage was greatest close to the water's edge, growing less as the solid land was approached, gradually at first, then more rapidly. These phenomenon seem to suggest that materials used in fill were shaken together (currently interpreted as liquefaction of loose sandy fills), so as to occupy less space with the accompanying development of waves, fissures, and structural damage."
>
> "The area of about eighty feet frontage which has sunk to a maximum of about eighteen inches in front of the Market-street Ferry building and the depression of somewhat greater area and to a maximum depth of about three feet, at the northwest corner of the same building, are the extreme cases of susidence along the main waterfront."

3.9.4 DESCRIPTION OF EXISTING STRUCTURES

BART TUNNELS AND SPEAR STREET VENTILATION SHAFT

General. The BART subway tunnels extend from the Spear Street Ventilation Shaft at the east end of Embarcadero Subway Station to the San Francisco Ventilation Structure of the Transbay Tube directly beneath the Ferry Plaza restaurant. The two 18 foot diamenter circular tunnels were driven in the years 1968 to 1970 by means of a circular steel shield under compressed air. They are located about 60 feet below the surface of Market Street in Recent Bay Mud. During tunnel driving, a great number of abandoned timber piles were intersected by the tunnel and removed by cutting them. In addition, the tunnel passed within a few feet of the bottom of the old seawall at the foot of Market Street and between the pile foundations of the Embarcadero Freeway and the Ferry Building.

The tunnels were driven under compresssed air pressure to control the inflow of groundwater and help support the soil during excavation. The tunnels have flexible steel lining which allow the tunnels to follow the small movements of the surrounding soil caused by settlement, fluctuations in groundwater levels, or other external disturbances. The tunnel lining segements are bolted and caulked to prevent leakage.

Condition of the Tunnels. An inspection trip by project personnel into the BART tunnels conducted on December 15, 1985, indicated that most of the track bed of the tunnels is normally dry; however, there are wet spots on the track bed in some locations. This wetness is caused by water drips from steel tunnel lining. The drips either penetrated through the bolt holes and bolts or came through flanges of the steel segments. Under the Ferry Building, it was observed that the location of leaks through the tunnel lining flanges coincided with an area in the crown of the tunnel where a pile tip of a cut off timber pile is bearing against the tunnel lining. This lining area has been strengthened by a steel angle section welded against the plate of the tunnel lining. It was also observed that a number of one inch high strength bolts connecting the lining segments are corroded. There was also corrosion noted on the segments themselves.

Tunnel Invert Concrete, BART Track and Walkways and Cross Passages. In the bottom of the circular steel tunnels, plain concrete was placed after completion of the tunnel driving to provide a base for the BART tracks. The BART rails were directly attached to a second course of concrete by specially designed fasteners. The fasteners allow some vertical or horizontal track adjustment, whenever that become necessary.

A concrete walkway about two feet above top of rail was installed in each tunnel. The walkway is intended for use during tunnel maintenance and during emergencies. The walkways of the two parallel tunnels are connected by one cross passage between the two tunnels. This cross passage is at about midpoint between Embarcadero Station and the Ferry Building. It allows escape from one tunnel into the other tunnel should emergency conditions such as train fire make such an escape a requirement. Wet standpipes for fire fighting also are brought into the tunnel from the street surface.

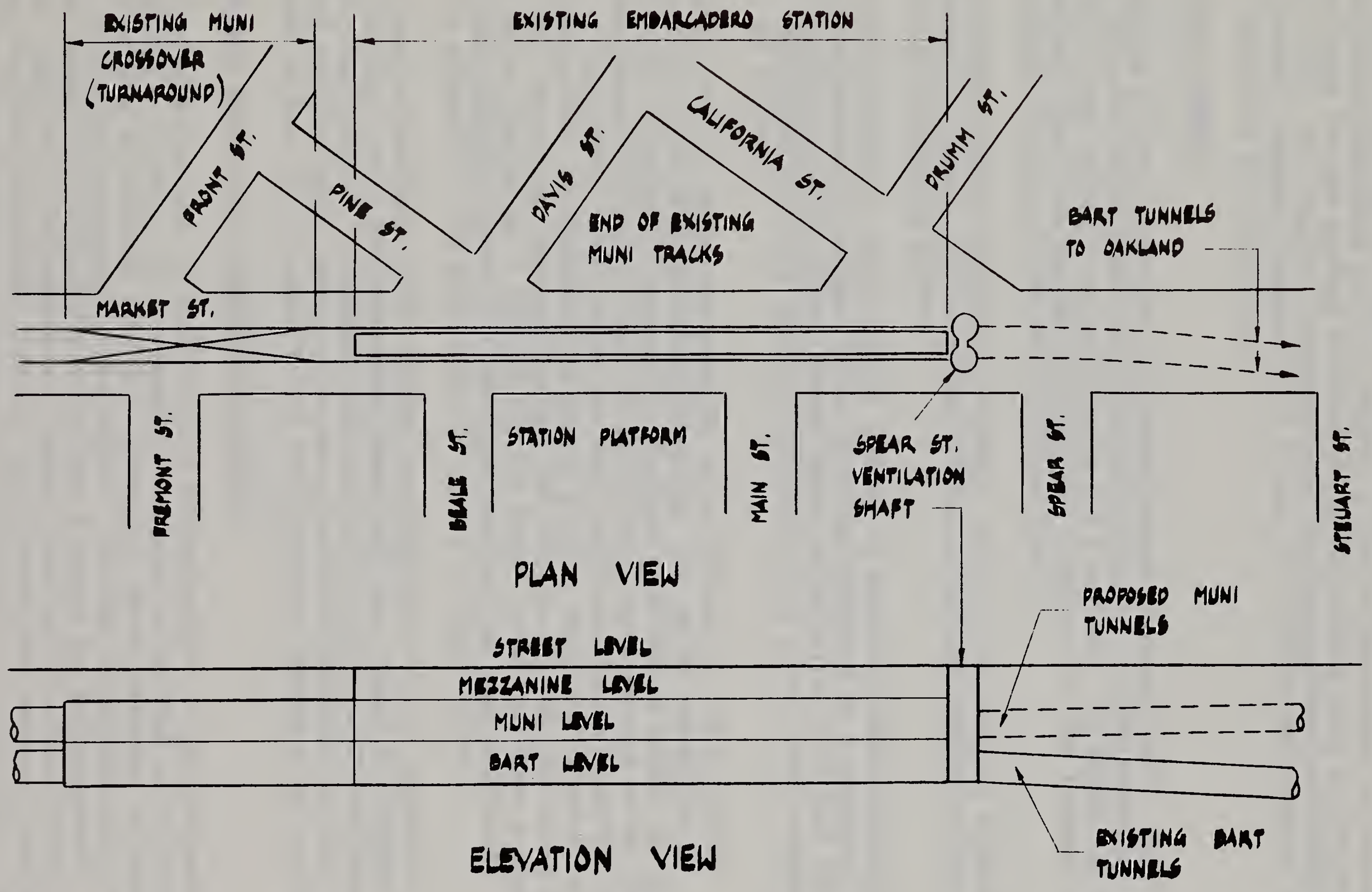
Third Rail and Utilities. 1000 V dc electrical power is conducted in a third rail located next to the track for the propulsion of the Trains. In addition to the third rail power, a waterline, an air pressure line, tunnel drainage pipes, various electrical conduits, and an antenna signal line are located in the tunnel.

Spear Street Ventilation Shaft. The Spear Street Ventilation Shaft is located at the east end of Embarcadero Station. The shaft is a concrete structure which extends from street surface to BART level and houses ventilation fans and ducts, and a drainage sump. The twin BART tunnels were driven from this shaft, flexible seals constructed of neoprene rubber gaskets and steel angles connect the steel tunnel lining to the concrete shaft. The seals are capable of allowing a certain amount of relative movement between the tunnels and the more rigid shaft structure.

During the BART tunnel inspection in December of 1985 the ventilation shaft was also inspected. Special attention was given to the seal connection of the tunnel lining to the concrete shaft structure. It was noted that there is water leakage at the seal which is manifested by wetness and the presence of leached out solids deposited on the trackbed.

MUNI FACILITIES AT EMBARCADERO STATION

The Embarcadero Station under Market Street and between Fremont and Spear Streets is the downtown terminal of the J, K, L, M, and N lines of the MUNI Metro system. MUNI shares the mezzanine level with BART for passenger access and ticketing. The MUNI tracks and platform are located on the level below the mezzanine. BART tracks and platform are located on the lowest level of the station. A diagram of the existing station is shown in Figure 3.9-2.


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
FREMONT ST.
BEALE ST.
STATION PLATFORM
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.
STEUART ST.
PLAN VIEW
PROPOSED MUNI TUNNELS
STREET LEVEL
MEZZANINE LEVEL
MUNI LEVEL
BART LEVEL
EXISTING BART TUNNELS
ELEVATION VIEW

SOURCE: BECHTEL NATIONAL, INC.

FIGURE 3.9-2 EXISTING MUNI METRO FACILITIES AT EMBARCADERO STATION

The MUNI track level includes a track crossover immediately west of the platform to allow trains to change tracks either before or after reversing direction at the station platform. The MUNI platform has space on each side for loading and unloading four car trains, a supervisor's booth at the west end, and space for the storage of three disabled or ready cars at the east end of each track. The original construction of the Spear Street ventilation shaft included bridges to support MUNI tracks for a future extension of the tracks toward the Ferry Building.

EMBARCADERO FREEWAY

The existing freeway structure is a double decked concrete viaduct constructed in the 1950s and is situated along the Embarcadero at the northeastern shoreline of the peninsula of the City of San Francisco. It passes the Ferry Building and Pier 14 on the bay frontage and is bounded on the landside by the Justin Herman Plaza, as indicated in Figure 3.9-3.

The upper deck carries southbound vehicular traffic from both the Broadway and Clay Streets on ramps. The lower deck routes northbound traffic to exit at Broadway and Washington Streets.

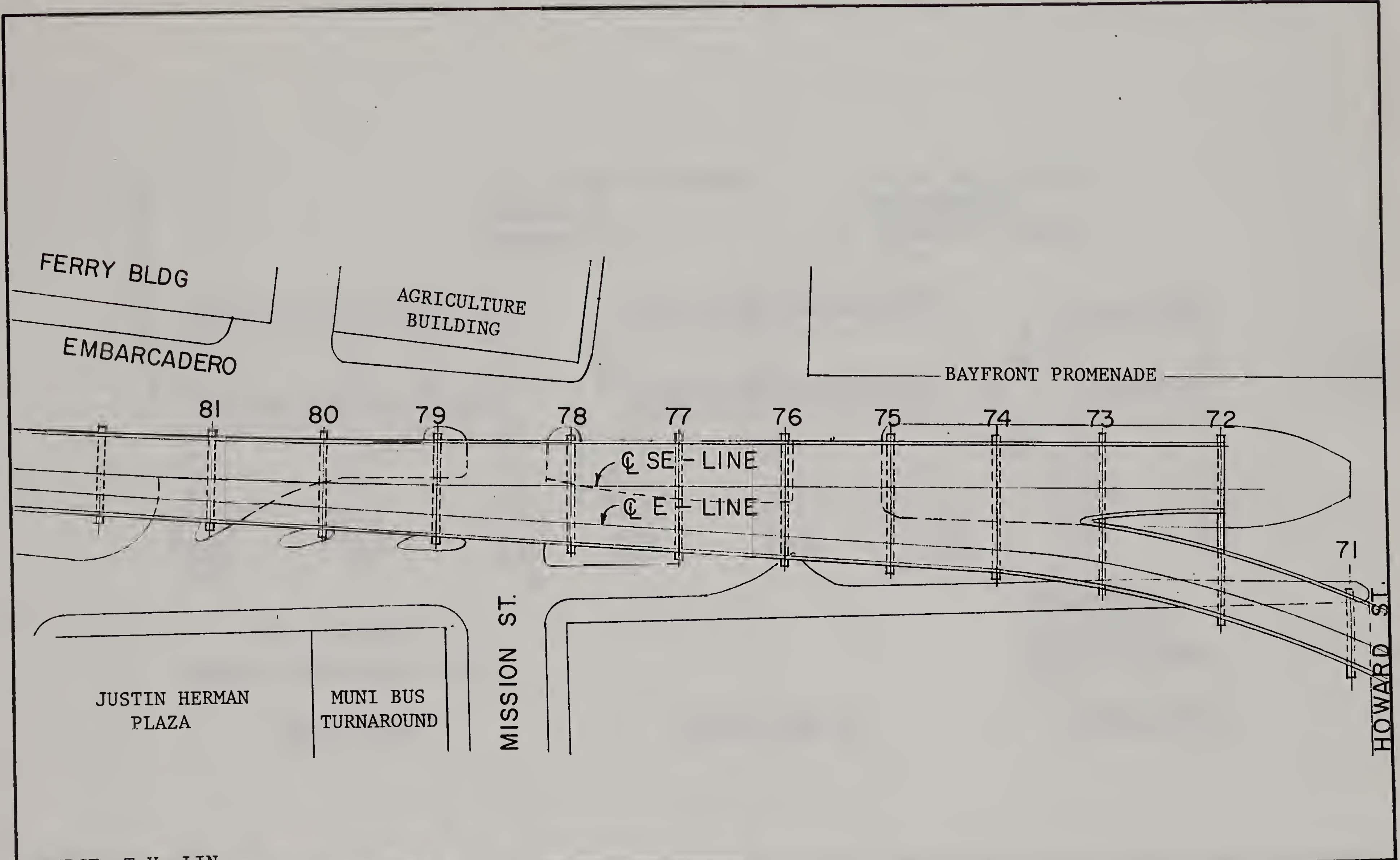
Both elevated decks of the structure consist of poured-in-place reinforced concrete multiple-cell continuous box girders, supported by a number of poured-in-place concrete portal frames which are referred to in this text as bents. The majority of the bents are spaced 75 feet apart, with a maximum spacing of 92 feet.

A total of ten (10) bents are expected to be affected by the projected construction of the MUNI Turnaround Facility, and can be identified consecutively as Bents 72 through 81, starting from Howard Street and going north past Mission Street. Bents 72 and 73 have three columns to the full height of the bents, resulting in two span reinforced concrete girders for both road decks. See Section 1 in Figure 3.9-4. Bents 79, 80 and 81 all have single span reinforced concrete girders for both decks. See Section 3 in Figure 3.9-4. For Bents 74 through 78, the portal frames all have a single span, post tensioned girder for the upper deck and two span reinforced concrete girders for the lower. See Section 2 in Figure 3.9-4.

The columns of the Embarcadero Freeway are supported on pile foundations. Groups of eight steel H-piles support each pile cap. Based on available records from CALTRANS, it appears that most of the piles penetrate through Old Bay Clay into the sands and/or alluvium-colluvium strata above bedrock. To the south of Bent 76, it appears that the piles were driven to or into bedrock.

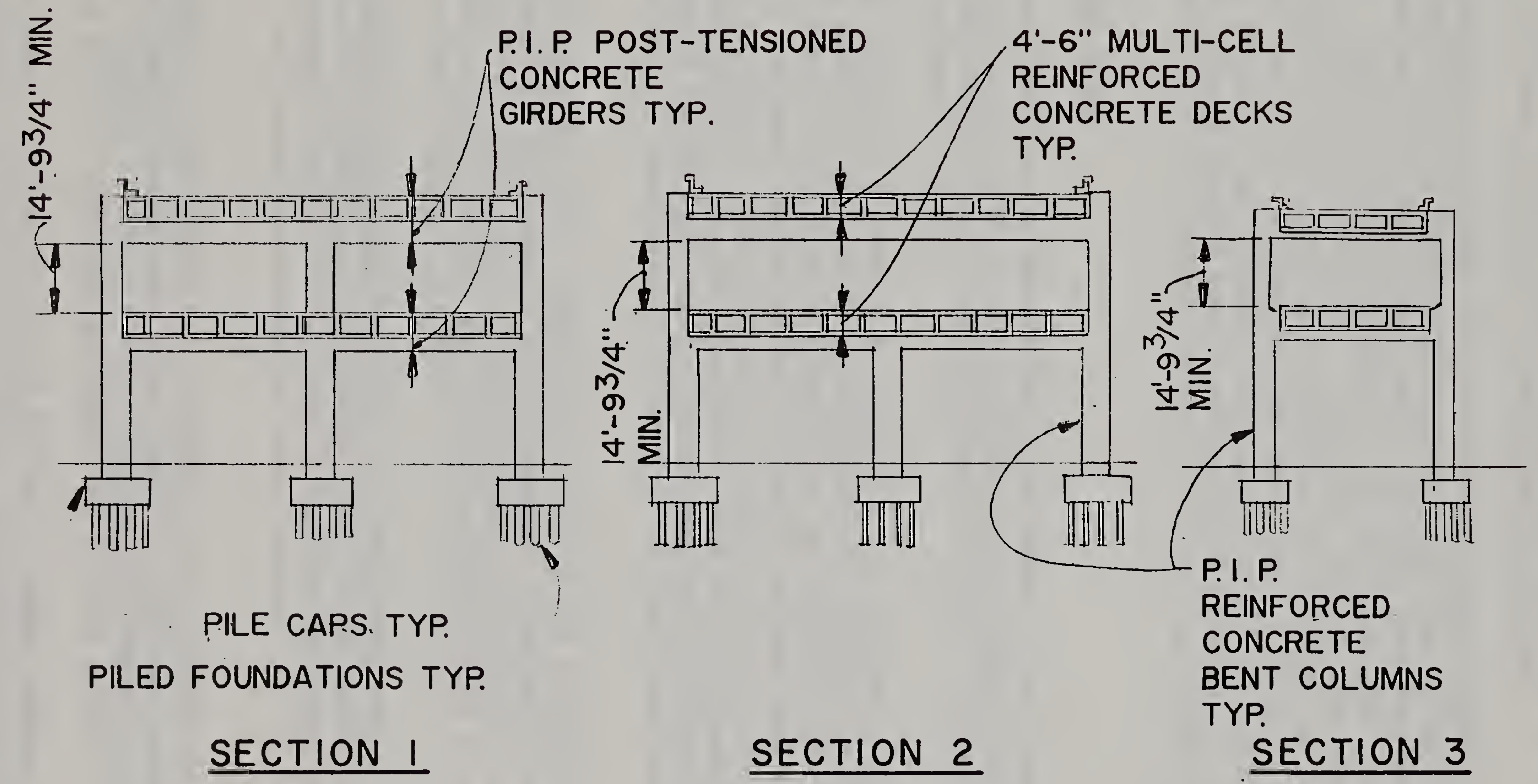
EMBARCADERO ROADWAY AND INTERSECTING STREETS

The Embarcadero Roadway is located along the waterfront of the northeastern part of San Francisco. It is flanked by maritime structures on its east side. The structures on its west side are, generally, older buildings of moderate height including some warehouse buildings. The MUNI Metro Turnaround Project extends along The Embarcadero between Market Street and Folsom Street. In the project study area, the Embarcadero Roadway intersects Mission, Howard, Folsom, Harrison, and Bryant Streets, which extend west and away from the waterfront. The Embarcadero Roadway in the project area from Clay to Howard


FERRY BLDG
EMBARCADERO
AGRICULTURE BUILDING
BAYFRONT PROMENADE
81
80
79
78
77
76
75
74
73
72
71
℄ SE-LINE
℄ E-LINE
JUSTIN HERMAN PLAZA
MUNI BUS TURNAROUND
MISSION ST.
HOWARD ST.
N
SCALE
1" = 100'

SOURCE: T.Y. LIN

FIGURE 3.9-3 PLAN OF EXISTING EMBARCADERO FREEWAY


14'-93/4" MIN.
P.I.P. POST-TENSIONED CONCRETE GIRDERS TYP.
4'-6" MULTI-CELL REINFORCED CONCRETE DECKS TYP.
14'-93/4" MIN.
14'-93/4" MIN.
PILE CAPS TYP.
PILED FOUNDATIONS TYP.
P.I.P. REINFORCED CONCRETE BENT COLUMNS TYP.
SECTION 1
SECTION 2
SECTION 3

SOURCE: T.Y. LIN

SCALE
1" = 40'

FIGURE 3.9-4 TYPICAL CROSS SECTIONS OF THE EXISTING EMBARCADERO FREEWAY

is undernearth or adjacent the elevated double decked Embarcadero Freeway structure, described ealier in the text. The northbound lanes of the Embarcadero Roadway are east of the freeway columns and the southbound lanes pass beneath the west column bay of the freeway structure.

The roadway surface of the four traffic lanes is asphalt paved. Between the northbound and southbound traffic lanes and in the east column bay, the surface is covered with hard gravel base. The Belt Railroad tracks are located here. The railroad is expected to be relocated away from the freeway structure and toward the waterfront. On either side of both northbound and southbound traffic lanes, curbs and sidewalks are provided in front of the Ferry Terminal and Ferry Building on the east, and in front of the Justin Herman Plaza, the MUNI bus terminal, and the Audiffred and YMCA building on the west. Off street parking spaces are provided adjacent to curbs and under the Embarcadero Freeway structure between the north and southbound traffic lanes.

BUILDING FOUNDATIONS

There are seven buildings between Mission and Howard Streets ranging from two to eight stories high. Most of the buildings have a single basement 10 to 12 feet deep. The foundations of the buildings are briefly described below in sequence from north to south.

The Audiffred building is located at the corner of Mission and Embarcadero. It is a three story building with a penthouse and a single basement. The building was probably constructed around 1890 and survived the 1906 earthquake; it has been designated as a historic landmark and was renovated in 1982. During renovation, only the exterior facade was reformed; a new steel frame was added and the old wood piles were removed and replaced by 10 inch diameter concrete filled pipe piles. The new piles were installed (closed ended) by jacking and penetrated 5 to 10 feet into the sands underlying the Bay Mud.

The 113-115 Steuart building, immediately south of the Audiffred building, is a two story brick building with a single basement (finished floor slab, elevation -7.9 feet, CCSF datum). The building is apparently supported on wood piles but no details on the building structure framing or pile foundations are available at this time.

The Jewish Community Federation building is a relatively new building (constructed in 1982) and is seven stories high. It is supported on 12 inch square, prestressed concrete piles, penetrating into the gray sand layer below the Bay Mud. The design tip elevations were reported as -133 feet (CCSF datum).

The Steuart Place building actually consists of two separate buildings, Steuart Place "North" and Steuart Place "South"; both were renovated in 1982. A new seismic resistant frame has been provided for both buildings. The buildings were built in 1890 and are supported on wood piles.

The North building is six stories high and has a single basement with finished floor slab elevation -10 feet (CCSF datum). The basement extends under the sidewalk approximately 20 feet east of the building line. The South building was originally built as a two story structure. During the recent renovation (upgraded for earthquake resistance), three stories were added.

No new piles were added to strengthen the foundations of either building because the new building design loads are significantly less than the original design loads. There is no information available regarding the size of the piles, their design capacity or depth of penetration.

The Pacific Union Hotel building adjacent to the YMCA was built in 1907 and is a five story brick structure with a single basement. It is supported on wood piles 12 to 16 inches in butt diameter. The eastern portion of the building is presently abandoned, while at the western end, a restaurant operates on the first floor. Visual observations by Dames & Moore indicate that significant differential distress has occurred in this building. It is considered likely that the initial pile foundations did not penetrate through the Bay Mud.

The YMCA building is eight stories high at the east end and two stories high at the west end. It has a single basement and a pile supported sidewalk, with crawl space under the sidewalk. The basement is estimated to be about eight feet below street level. It was constructed in 1926 and 1927. The building is a reinforced concrete structure with the columns supported on substantial pile caps up to 15 feet square. It appears from visual observations by Dames & Moore that this structure is in excellent condition.

The Bayside Plaza building at Embarcadero, Steuart and Howard Streets is eight stories high and has a single basement with finished slab elevation of -10 feet (CCSF datum). It is the newest building on the block and was constructed in 1984. Foundation construction records indicate that 14 inch prestressed concrete piles were driven to elevations -118 feet to -138 feet (CCSF datum). The piles apparently penetrated into the sands and colluvium below the Bay Mud.

LOCATION OF UTILITY LINES

The project area is traversed by many subsurface utilities. The utilities are generally located within the paved area of public street rights-of-way. They include facilities which are publicly owned and private utility companies. A complete description of utility lines in the project area can be found in the Final Engineering Report (Reference No. 1).

Storm sewers and sanitary sewers in San Francisco are usually combined. Within the project area, a box sewer, ranging in size from 15 feet to 17.5 feet, extends from a diversion structure at the intersection of Howard and Steuart Streets southerly along the west side of Steuart to the vicinity of Harrison Street before following The Embarcadero to the south. A 36 inch sewer force main runs along The Embarcadero and turns west into Howard Street. An eight inch sewer line runs along the west curb of The Embarcadero in front of the YMCA building.

Water facilities include a 12 inch high pressure line along Mission Street to the west side of The Embarcadero. A service loop of 10 inch to 12 inch lines is located in Howard, Embarcadero, Folsom and Steuart Streets. Harrison Street contains 8 and 12 inch lines that run westerly to The Embarcadero, and Bryant contains an 8 inch line to The Embarcadero.

Major telephone facilities are located parallel to the curb line in front of the YMCA building on The Embarcadero, branching to the west at Howard Street. Three large vaults, providing transcontinental service via a crossing beneath the Bay, are located beneath the Embarcadero Freeway structure in the vicinity of Howard Street and include three duct banks with 16, 12 and 14 ducts. Mission Street has two telephone duct banks that extend to The Embarcadero. Five telephone manholes and conduits are located along the west side of Steuart extending to its intersection with Folsom Street. Harrison Street contains four ducts that extend to The Embarcadero.

Gas facilities include an eight inch line in the west side of The Embarcadero that extends from north of Mission to Folsom Street. A four inch line in Harrison Street extends to The Embarcadero and runs southerly to Bryant Street.

Several abandoned electric power lines are in Howard Street. An electric manhole is located in the intersection of Howard and The Embarcadero and three electric duct banks are located in The Embarcadero along the west side. Additionally, an electric line and manhole are located in Steuart Street.

Fire alarms, traffic signals and street lights are located throughout the area. Each of these has associated with it conduit and cable for electric power and pull boxes.

MARKET STREET - ROADWAY AND STREET FACILITIES

Market Street has two lanes of traffic in each direction. The roadway is 50 feet wide and the total right-of-way between building lines is 120 feet. Indented parking areas for delivery vehicles have been incorporated into the street design. Market Street intersects with Spear Street and Steuart Street in the project area and with Beale Street, Fremont Street, Drumm Street, California Street, Davis Street, Pine Street and Front Street in the vicinity of the project area. Market Street is paved with concrete pavement and has curbs and brick covered sidewalks and pedestrian crossings as designed in the Market Street Beautification Plan of 1968. On the sidewalks are located "Path of Gold" light standards and an abundance of tree plantings. Overhead wire for MUNI trolley buses traveling along Market Street is strung from the light standards.

Between Beale Street and Spear Street, the Embarcadero Station is used for passengers of both MUNI Metro and BART and accessed by stairs and escalators from the sidewalks. At the intersection of Drumm and California Streets at Market Street, and in front of the Hyatt Regency, is the starting point of the California Street cable car equipped with ticket station and car turntable. Justin Herman Plaza is located at the end of Market Street. Beyond the Plaza, the Ferry Building terminates Market Street at the waterfront.

3.10 WATER RESOURCES

3.10.1 SURFACE WATER RESOURCES/RUNOFF AND WATER QUALITY

DRAINAGE AND RUNOFF

Drainage in the downtown portion of San Francisco including the project site is heavily influenced by the existing urban development and infrastructure. The project site is almost entirely covered by impervious surfaces (roads, sidewalks, or structures) and is situated on relatively level terrain. A small portion of the project site comprising Justin Herman Plaza is landscaped and, therefore, pervious to rainfall. Much of the rainfall striking the landscaped portions of Justin Herman Plaza infiltrates into the soil. Most runoff from the remainder of the project site travels by overland flow along sidewalks, street curbs and gutters into the San Francisco combined storm/sewer system. San Francisco's sewer wastewater and storm water runoff drain into the same collection system. This has caused high peak flows to the treatment plants during the rainy season and subsequent overflows of raw sewage into San Francisco Bay and into the ocean. In order to correct this situation, the City is implementing the San Francisco Wastewater Management Plan. Under the wastewater plan, the system is designed to handle peak wet weather flows, the majority of which is storm water runoff. A large box sewer exists below The Embarcadero. The box sewer temporarily stores all storm sewer and sanitary sewer discharge backed up from the treatment plant, which occurs mainly during peak wet weather flows. This container accommodates the overflow of raw sewage and storm runoff which, in the past, was discharged untreated into the bay. All runoff from the project site and areas to the west drains into the box sewer where it is either stored or immediately conveyed to the treatment plant, depending on wet or dry weather flows at the time.

SURFACE WATER QUALITY

The integrity of San Francisco Bay waters is largely dependent upon substances contained in urban runoff, storm water systems, agricultural drainage and accidental spills as well as municipal and industrial waste discharges. Specific water quality data are not available for surface waters of the project site. The surface waters of the project site probably have varying amounts of naturally occurring and human generated pollutants. Natural pollutants include sediments, organic materials, and nitrates. While these pollutants are found as naturally occurring components of stream waters, the development of an urban environment can result in highly elevated levels of these and other contaminants. Many of the pollutants associated with an urban environment are a result of vehicular activity and include lead, zinc, copper, hydrocarbons, and petroleum products.

3.10.2 GROUNDWATER RESOURCES

In the project area, groundwater levels fluctuate slightly with tidal changes. These fluctuations become more pronounced near the seawall and where rubble fill is relatively permeable. Depth to groundwater at the project site ranges from nine to eleven feet. Because much of the project area is impermeable, the area is not considered an important recharge area. Much of the existing groundwater has been intruded by seawater, rendering the supply brackish and unpalatable.

As will be discussed in greater detail in Section 3.12, Hazardous Materials, the results of a preliminary assessment of past and present potential hazardous waste sources in and adjacent to the project area indicate that there are a limited number of suspect "on site" and "off site" land uses with potential for causing groundwater contamination (Dames and Moore, Geotechnical Report, 1988). Contacts with local agencies indicate that there are no active cleanup sites for toxics or fuel leaks in the vicinity of the project site, nor are there any current industrial discharges into sewers adjacent to the proposed excavations. However, there are seven locations within 100 feet of the project site where contamination of soil or groundwater from leaking underground petroleum storage tanks is known or suspected. Refer to Section 3.12 for the locations of these sites. The presence of such hazardous materials in groundwater if they exist at the project site should be detected in the Hazardous Waste Analyses required by the Maher Ordinance (#443-86).

3.10.3 FLOODPLAINS/WETLANDS

FLOODING

Much of the area of downtown San Francisco, including the project site, has not been mapped by the Federal Emergency Management Agency (FEMA), nor are they expected to be in the future due to extensive land alterations that have occurred in the area. Natural drainage channels and floodplains do not exist in the project area. Some localized ponding of rainwater occurs along street curbs and other low lying areas following heavy rainfall.

The project site is located within the 200 year tsunami inundation zone. Tsunamis are water waves that are caused by sudden vertical movements of a large area of the sea floor during an earthquake. A tsunami of this magnitude has the probability of occurring once in 200 years. The project site would be inundated by approximately six feet of runup water from a 200 year tsunami event.

WETLANDS

The entirety of the project site has been altered through either landscaping or urban development. Therefore, no wetlands occur on the project site.

3.11 BIOLOGY

EXISTING SETTING

The biological features of the project sites are limited due to the urbanized character of the project area. Landscaping provides some habitat for birds adapted to urban development. Small rodents, most of which are considered pests, also inhabit buildings, yards and drainageways along with cats and dogs.

3.11.1 TERRESTRIAL VEGETATION

Trees and shrubs found on the study site are those commonly used in urban landscaping, such as eucalyptus trees (*Eucalyptus* spp.), London Plane trees (*Platanus acerifolia*), pines (*Pinus* sp.), willows (*Salix* sp.), and plum trees (*Prunus* sp.). These trees generally line the streets between the sidewalk and the curb. Throughout the study site, English ivy (*Hedera helix*) is extensively used both as a groundcover beneath the street trees and as a climbing vine on freeway off-ramps support pillars.

Market Street between Spear and Steuart Streets has a double row of London Plane trees every 20 to 30 feet. The southwest side of Justin Herman Plaza, bordered by Steuart and Market Streets, is lined with approximately 20 London Plane trees. Fifteen street trees separate the Hyatt Regency from the park. Other areas of the park are landscaped with pine, willow, Lombardy poplar, eucalyptus, cherry (*Prunus emarginata*) and purpleleaf plum (*Prunus cerasifera*), as well as seasonal flower plantings.

3.11.2 TERRESTRIAL WILDLIFE

The majority of birds inhabiting the project area would be those adapted to urban conditions such as mourning doves, starlings, house sparrows, finches, robins, hummingbirds, and gulls. Common rodents would be Norway rat, black rat, house mouse, western gray squirrel and fox squirrel.

3.11.3 MARINE VEGETATION

The edge of the bay extends below the piers, parking lots, and buildings that currently line the bay within the study site. If any marine vegetation is present at the study site, it would be located on the bottom of the bay. Constant turbidity of the bay restricted a field survey of any existing marine vegetation. Turbidity would also, however, limit growth of such vegetation.

3.11.4 MARINE WILDLIFE

Marine animals present could not be estimated due to the turbid condition of the bay; however, marine animals are not expected to be common in close vicinity of such a developed shore.

3.11.5 RARE, THREATENED AND ENDANGERED SPECIES

No rare or endangered species have been identified within the study site (Sorenson, 1988), nor are any expected due to the site's urban condition.

3.12 HAZARDOUS MATERIALS

Definitive studies concerning the presence of hazardous materials will be completed as part of the Phase II (Final Design) studies for the project. To date, the results of a preliminary assessment of past and present potential hazardous waste sources in and adjacent to the Turnaround Project area indicate that there are a limited number of suspect "on site" land uses with potential for causing soil or groundwater contamination (Dames & Moore, 1988a). The locations of these sites and the suspected contaminants are tabulated below:

Location	Past Usage	Present Usage	Potential Contaminant
1. Block bounded by Market, Mission, Steuart and Embarcadero	Lumber Yard	MUNI Bus Turnaround and Justin Herman Plaza	Arsenic and lead, oil, grease, fuel
2. Block bounded by Howard, Folsom, Steuart and Embarcadero	Lumber Yard		Arsenic and lead
	Coal Yard		Copper, zinc and aromatic compounds
	Paint Shop		Volatile organic compounds
	Electric Equipment Manufacturing	Parking Facility	Grease, solvents
		Abandoned Woodframe Structure	
	Machine Shop	Marine Terminals Corporation	Oil and grease
	Auto and Truck Depot	Electric Equipment Manufacturing	Oil, grease, fuels, solvents
	Lawn Mower Repair Shop		Oil, grease, solvents
	2 Underground Storage Tanks Removed in February and September 1987		Petroleum hydrocarbons
3. The Embarcadero Market Street to Folsom Street		Belt Railroad	Oil, grease, fuel, polynuclear aromatic hydrocarbons (PNAs), lead, arsenic, cyanide

Other potential "off site" sources of potential contamination are shown in Table 3.12-1. "On site" land uses are those occupying the area in which excavations will be performed for the Turnaround Project. "Off site" land uses are those within 100 feet of the "on site" areas. The 100 foot zone was selected for study of potential hazardous waste contamination sources in accordance with the requirements of the CCSF Ordinance No. 443-86 "Analyzing Soil for Hazardous Wastes," also known as the Maher Ordinance.

3.12.1 HISTORICAL, ARCHIVAL AND AGENCY RECORDS

The primary sources of information for hazardous waste studies regarding historical land uses were Sanborn Insurance Company Maps of 1886/87, 1899, 1913, 1929, 1948, 1950, 1965 and 1987 and the 1977 Olmsted & Olmsted San Francisco Waterfront report. Other sources included discussions with property owners, City and County of San Francisco files, the Port of San Francisco, and others. Contemporary land uses were investigated by conducting a site visit and discussions with owners and operators of businesses within the study area. A complete list of references in included in the Reference Section of this EIS.

Contacts with local government agencies (San Francisco Bay Regional Water Quality Control Board, California Department of Health Services in Emeryville and the City and County of San Francisco Department of Public Works) indicate that there are no active cleanup sites for toxics or fuel leaks in the vicinity of the proposed MUNI Turnaround Project nor are there any current industrial discharges into sewers adjacent to the proposed excavations.

There are seven locations within 100 feet of the proposed Surface or Underground Alternative alignments where contamination of soil or groundwater from leaking underground petroleum storage tanks is known or suspect. The current status of activities concerning these tank sites is shown in Table 3.12-1; locations are shown in Figure 3.12-1.

3.12.2 ABATEMENT AND REMEDIAL ACTION SITES

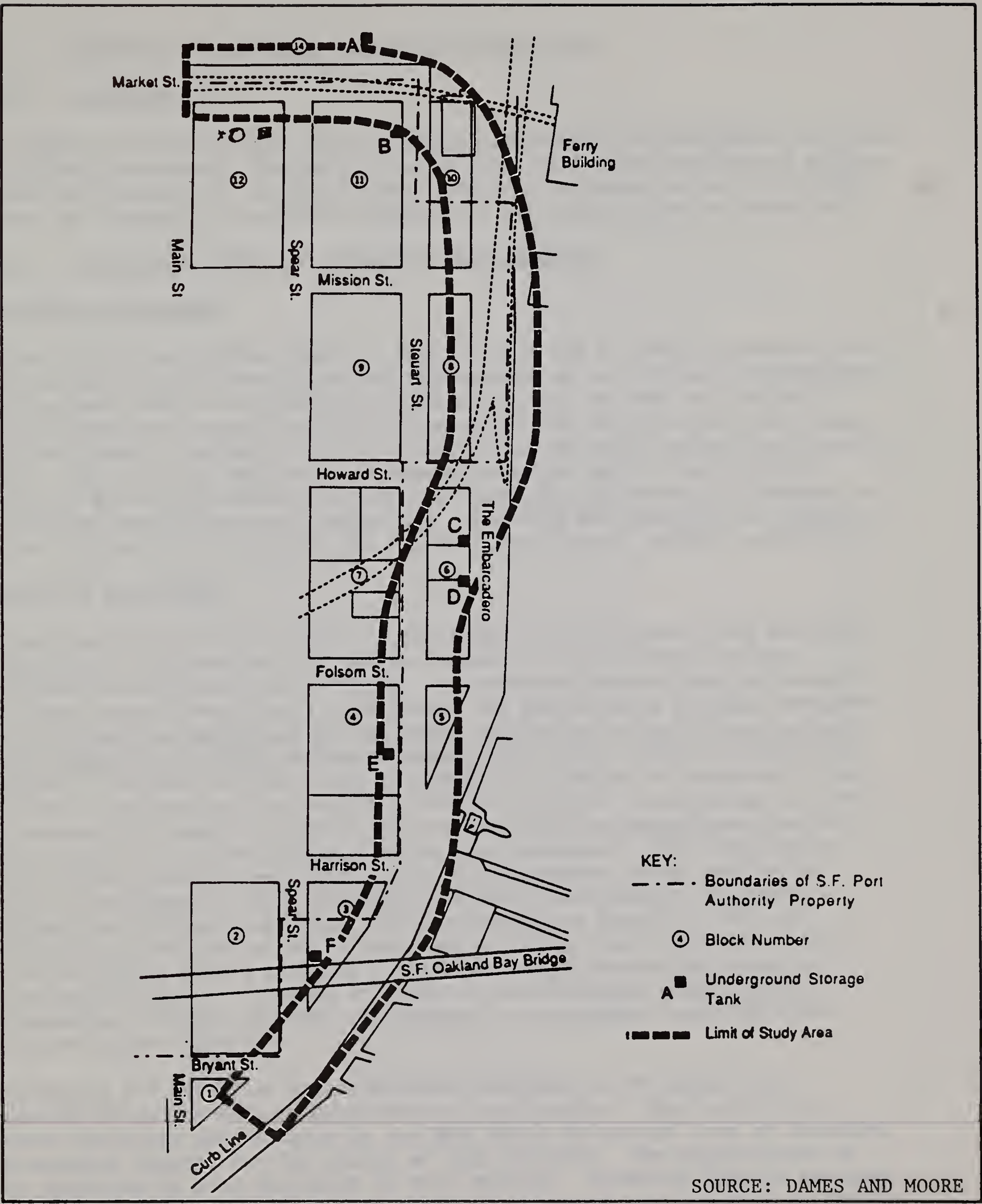
Other than the Underground Storage Tank sites listed in Table 3.12-1, there are no known abatement and remedial action sites in the vicinity of the proposed Turnaround Facilities (California Regional Water Quality Control Board, San Francisco Bay Region, 1988; Sunga, M., California Department of Health Services, 1988).

The most significant hazardous waste cleanup in Yerba Buena Cove within the recent past (1985) has been at the 301 Howard Building site (southwest corner of Howard and Beale Streets about 1,500 feet westerly of the proposed MUNI Turnaround). During the excavation for the building basements, hazardous substances were encountered near the fill/Bay Mud interface which are allegedly associated with residue dumped into the bay in the late 1800s from a Pacific Lighting Company gas illuminating plant operating at First and Fremont Streets (reference San Francisco Chronicle, April 28, 1986). Available information indicates that these gas plant residues would not have been transported either in fills or by bay currents into the MUNI Turnaround Project area. Evidence supporting this opinion includes the fact that recent building excavations for the Bay Side Plaza Building at Howard Street and The Embarcadero and the Rincon Annex at Howard between Steuart and Main Streets did not encounter any suspect hazardous wastes that required special treatment of the excavated soil or the groundwater. The presence of such hazardous materials, if they exist at the Turnaround Project site, should be detected in the Hazardous Waste Analyses required by the Maher Ordinance.

Table 3.12-1

Leaking Underground Petroleum Storage Tanks Being Monitored or Previously Removed

Location	Address	Status	Reference
0.	101 Market St.	Underground storage tank (UST) currently being monitored for fuel leaks.	M. Sunga (1988)
A.	5 Embarcadero Center	Underground storage tank (UST) currently being monitored for fuel leaks.	J. Carroll (1988)
B.	1 Market Plaza	Concrete-encapsulated UST removed, no soil testing was required by the San Francisco Department of Public Health (9/10/87).	CCSF, DPH (1988)
C.	240 Embarcadero	Fuel UST removed and soil tested in September 1987. Testing indicated petroleum hydrocarbon contamination of 9746 ppm. Contaminated soil left in place.	CCSF, DPH (1988)
D.	260 Embarcadero	Unleaded gas UST removed and soil tested in February 1987. Testing indicated Total Petroleum Hydrocarbons = 1800 ppm, benzene = 85 ppm, toluene = 360 ppm, xylene = 63 ppm. Contaminated soil was left in place.	CCSF, DPH (1988)
E.	242 Steuart Street	Gasoline UST removed and soil tested in June 1986. Tests indicated Total Petroleum Hydrocarbons = 13-45 ppm, Total Diesel Hydrocarbons = 25-50 ppm. These results are below the present regulatory action levels.	CCSF, DPH (1988)
F.	Spear Street between Harrison and Bryant Streets	UST removed and soil tested. No significant contamination found	Port of San Francisco (1988)


A
14
Market St.
Ferry Building
B
12
11
10
Main St
Spear St.
Mission St.
Steuart St.
9
8
Howard St.
The Embarcadero
C
7
6
D
Folsom St.
4
5
E
Harrison St.
2
3
Spear St.
F
S.F. Oakland Bay Bridge
Bryant St.
1
Main St.
Curb Line
KEY:
Boundaries of S.F. Port Authority Property
Block Number
Underground Storage Tank
Limit of Study Area

SOURCE: DAMES AND MOORE

SCALE

FIGURE 3.12-1 LOCATIONS OF REMOVED OR MONITORED UNDERGROUND STORAGE TANKS WITHIN 100' OF PROPOSED EXCAVATION

3.13 HISTORIC AND CULTURAL RESOURCES (SECTION 106)

3.13.1 INTRODUCTION

This chapter discusses legal and regulatory requirements pertaining to historic and cultural resources. The point to which this DEIS takes the process in compliance with Section 106 of the National Historic Preservation Act is discussed, and an inventory of cultural resources in the project area is presented.

3.13.2 APPLICABLE LEGAL AND REGULATORY REQUIREMENTS

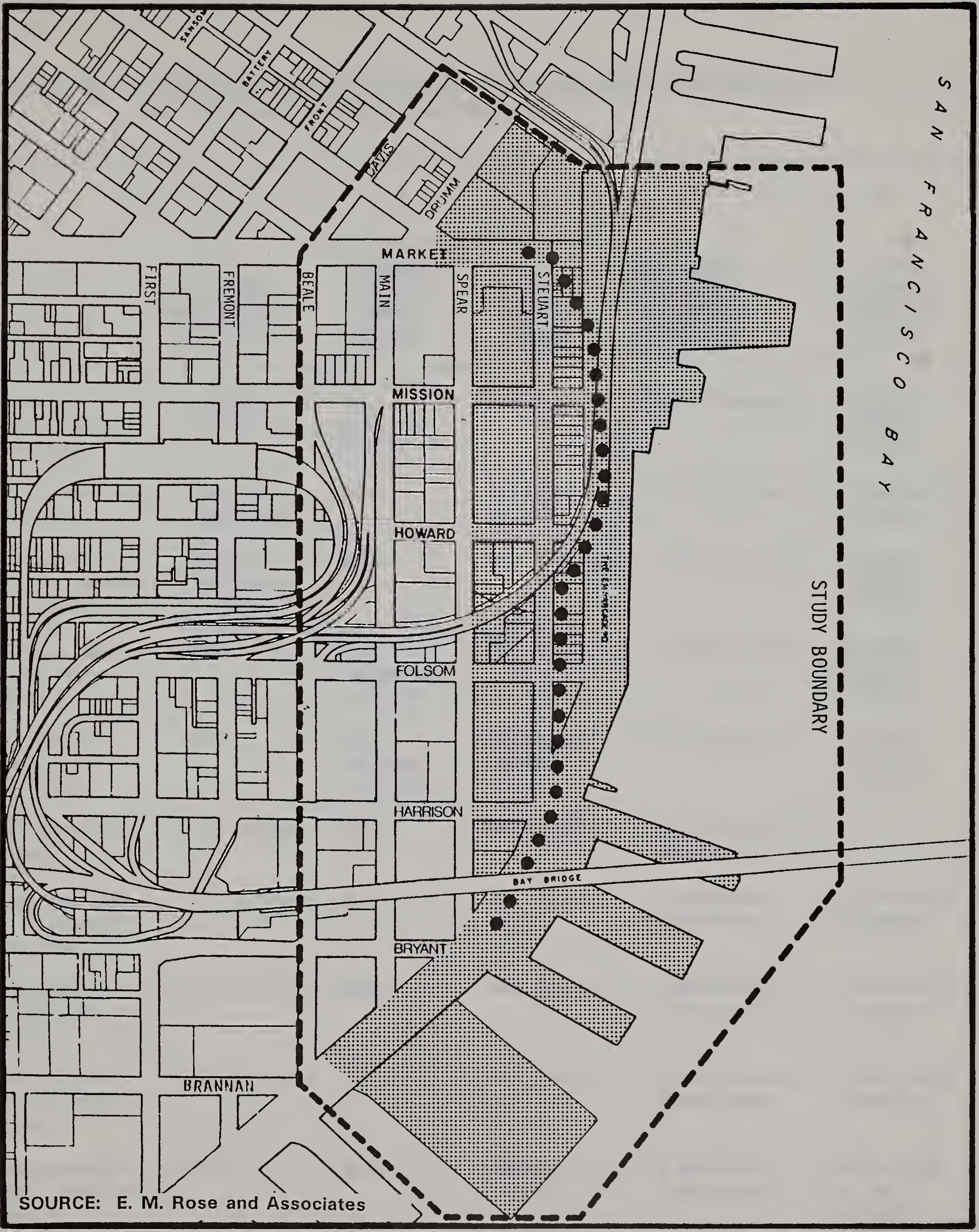
REGULATORY REQUIREMENTS

Section 106 of the National Historic Preservation Act of 1966, as amended, and Executive Order 11593 "Protection and Enhancement of the Cultural Environment" requires that impacts of Federally assisted projects be examined for all historic districts, sites, buildings, structures, or objects, and archaeological sites listed or eligible for inclusion in the National Register of Historic Places. The Act also requires that Federal agencies afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on undertakings that affect such properties. The ACHP has established procedures for the "Protection of Historic and Cultural Properties" (36 CFR, part 800).

SECTION 106 COMPLIANCE

In the.preparation of this DEIS, the following activities have been performed in compliance with Section 106. At the request of the California State Historical Preservation Office (SHPO), a literature research for the historic and archaeological resources in and around the project area has been prepared (see San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887, Reference Document No. 10). SHPO also requested that MUNI files from the 1978-1980 period on this project be reviewed. The files were reviewed and the results presented in SHPO. The findings reflected that request for historic surveys and archeological investigations from the earlier period of the project have since been addressed. The most recent investigations occurred as a part of the I-280 Transfer Study and the San Francisco Department of City Planning's detailed evaluation of historic buildings for the Downtown Plan. The inventory data from the I-280 and Downtown Plan EIRs are therefore utilized, as appropriate, for this project due to the recent nature of these studies and the corresponding areas of environmental impact. The Area of Potential Environmental Impact (APEI) for the Turnaround Project has been established in coordination with SHPO and UMTA (see Figure 3.13-1).

The historic and potential archaeological resources in and around the Turnaround Project area are identified in this section. See Table 3.13-1, Historic Buildings and Elements in the MUNI Metro Turnaround Area of Potential Environmental Impact, for the status of each resource. The significance of these resources is also discussed in this section. Potential impacts and possible mitigation measures to protect historic resources are presented in Chapter 4.13. In further preparation of the DEIS, the Northwest Regional Archaeological Survey was also consulted to research possible archaeological resources in the project area. The San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887 reports the result of this research.


SANSO
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
HOWARD
THE EMBARCADERO
FOLSOM
HARRISON
BAY BRIDGE
BRYANT
BRANNAN
SAN FRANCISCO BAY
STUDY BOUNDARY

SOURCE: E. M. Rose and Associates

PROJECT STUDY AREA

FIGURE 3.13–1

● ● ● PROJECT LOCATION (BUILD ALTERNATIVES)
▨ POTENTIAL ENVIRONMENTAL IMPACT AREA
— — — STUDY AREA

800 FEET

TABLE 3.13-1. HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

FACILITY	1 HERITAGE ARCHITECTURAL INVENTORY	2 SAN FRANCISCO LANDMARKS ADVISORY BOARD ACTION	3 DOWNTOWN PLAN	4 HERITAGE DOWNTOWN INVENTORY PHASE II	5 I-280 HISTORIC PROPERTIES SURVEY
Union Ferry Depot, Market/ The Embar.	A-Highest Importance	City Landmark 7/9/77	Not Rated	Not Surveyed	National Register 12/1/78
S.P. Building, 1 Market	A-Highest Importance	None	Category I Retain	Not Surveyed	Potentially Eligible
Agriculture Bldg., Mission/ The Embar.	A-Highest Importance	None	Not Rated	Not Surveyed	National Register 12/1/78
Rincon Annex, 99 Mission/ Spear	DCP-3	City Landmark 2/10/80	Not Rated	Not Surveyed	National Register 11/16/79
Audiffred Bldg., 1 Mission	DCP-3	City Landmark 4/11/68	Category I Retain	Not Surveyed	National Register 5/10/79
110-116 The Embar.	Not Surveyed	None	Not Rated	C-Contextual Importance	
East St. Imp. Co., 128-132 The Embar.	Not Surveyed	None	Not Rated	C-Contextual Importance	Potentially Eligible
Hihn/Meyer Bldg., 137-143 Steuart	Not Surveyed	None	Not Rated	C-Contextual Importance	Potentially Eligible
Embarcadero Inn, 144-146 Embar.	Not Surveyed	None	Not Rated	C*-Contextual Importance	Potentially Eligible
Embarcardero YMCA, 166 The Embar.	DCP-1	None	Category I Retain	A-Highest Importance	Determined to be Eligible (2-26-82)

(CONTINUED)

TABLE 3.13-1 (CONTINUED). HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

FACILITY	1 HERITAGE ARCHITECTURAL INVENTORY	2 SAN FRANCISCO LANDMARKS ADVISORY BOARD ACTION	3 DOWNTOWN PLAN	4 HERITAGE DOWNTOWN INVENTORY PHASE II	5 I-280 HISTORIC PROPERTIES SURVEY
Seaman's Inst., 240-242 Steuart	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Hills Coffee, 2 Harrison	DCP-4	City Landmark 11/7/82	Not Surveyed	Not Surveyed	National Register 10/16/81
Pier 22-1/2 Fireboat House	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 24 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 26 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 28 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
San Francisco-Oakland Bay Bridge	Not Rated	None	Not Surveyed	Not Surveyed	Potentially Eligible
Cable Car System, Calif./ Market	Not Rated	None	Not Rated	Not Surveyed	National Register 10/15/66
Belt Line RR Right-of-Way	Not Surveyed	None	Not Surveyed	Not Surveyed	Potentially Eligible
New Seawall	Not Surveyed	None	Not Surveyed	Not Surveyed	Determined to be Eligible (11-3-78)

SOURCES

Column 1 San Francisco Foundation for Architectural Heritage C-3 Survey, Phase I.

(CONTINUED)

TABLE 3.13-1 (CONTINUED). HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

	Splendid Survivors, San Francisco Foundation for Archtectural Heritage, California Living Books, 1979.
	DCP Rating: 1976 Architectural Inventory, Department of City Planning. A visual and urban design inventory of building design quality. Ranking system from 0 - contextual significance - to 5 - lowest to highest significance.
Column 2	San Francisco Landmarks Advisory Board, phone conversation with Johnathan H. Malone, May 27, 1986.
Column 3	San Francisco Downtown Plan, 1986. A Comprehensive Plan Element; Ordinance #414-85 amending the Planning Code of the City and County of San Francisco. Appendix C, updated by phone coversation with Larry Badner, May 28, 1986.
Column 4	San Francisco Foundation for Architectural Heritage, C-3 District Inventory Phase II, Chris Nelson phone conversation, May 27, 1986. Uses rating system from Phase I, explained in Splendid Survivors.
	C rating can be increased if alterations removed or if architect is discovered. Asterisk (*) indicates added significance.
Column 5	California Transportation Department, San Francisco, 1983, I-280 Transfer Concept Program Historic Properties Survey Report and the San Francisco Landmarks Advisory Board; phone conversation update, May 27, 1988.

If it is determined that the preferred alternative adversely affects a resource listed on or eligible for the National Register, a Determination of Effect and a Preliminary Case Report will have to be prepared in compliance with the Historic Preservation Act.

3.13.3 HISTORIC RESOURCES POTENTIALLY AFFECTED

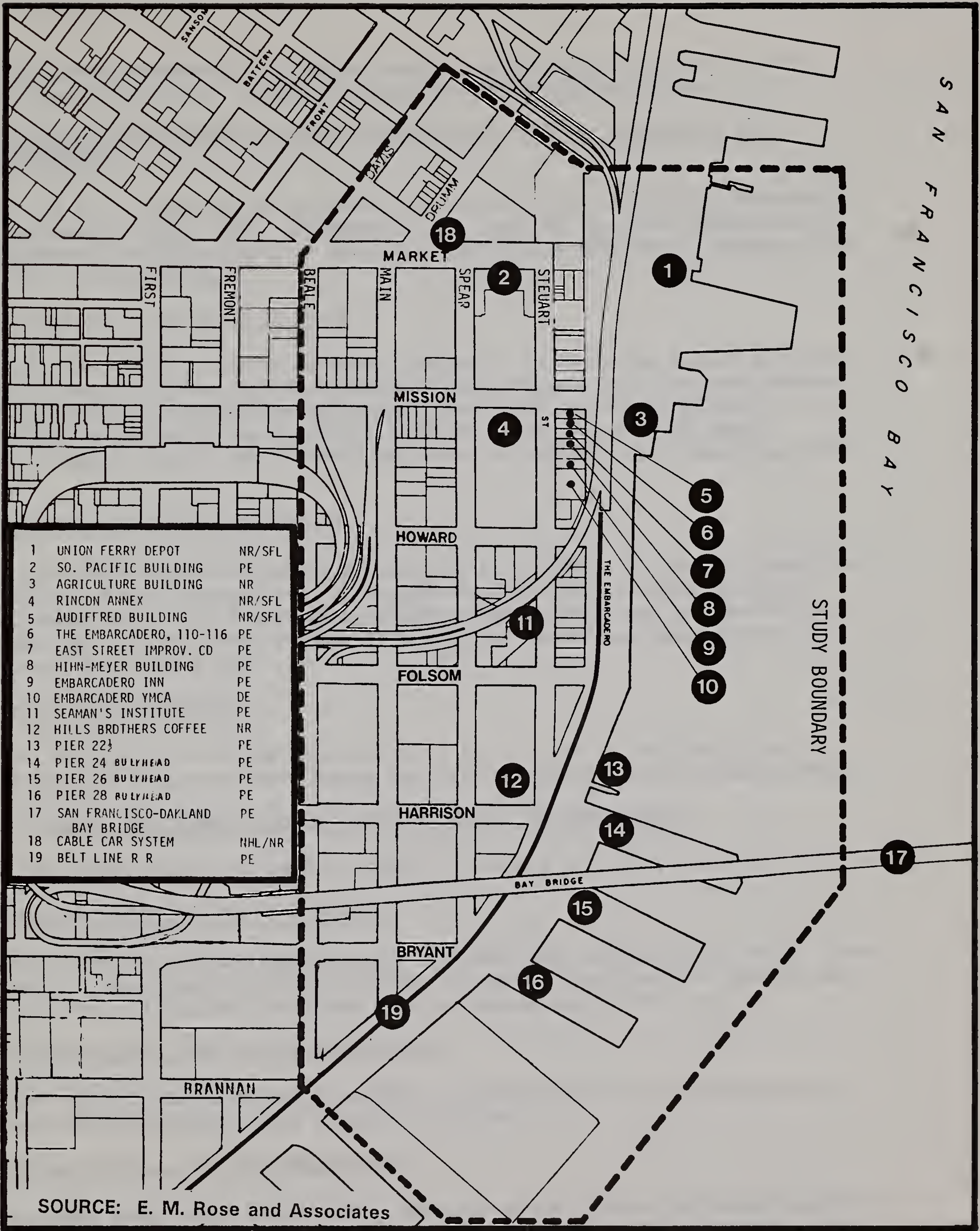
The historic/architectural buildings discussed below are in the immediate APEI (see Figure 3.13-1). A summary of the historic resources within the APEI is presented in Table 3.13-1. The location of these resources is illustrated by Figure 3.13-2. A comprehensive listing of historic resources in the general study area is presented in Reference Document No. 5.

FERRY BUILDING, UNION FERRY DEPOT, FOOT OF MARKET AT THE EMBARCADERO

Constructed between 1894 and 1898, the Ferry Building served as San Francisco's ferry terminal and housed Port and State offices. Its designer, A. Page Brown, was one of the City's most important pre-fire architects. The Ferry Building survived the 1906 conflagration and was remodeled after ferry service ended in 1958.

SOUTHERN PACIFIC BUILDING, 1 MARKET STREET

The Southern Pacific Building was one of the earliest corporate headquarters buildings in San Francisco. Designed by Bliss and Faville and built in 1916,


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
18
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
1
2
MISSION
ST
3
4
5
6
7
8
9
10
HOWARD
11
THE EMBARCADERO
FOLSOM
STUDY BOUNDARY
SAN FRANCISCO BAY
12
13
HARRISON
14
17
BAY BRIDGE
15
BRYANT
16
19
BRANNAN

1	UNION FERRY DEPOT	NR/SFL
2	SO. PACIFIC BUILDING	PE
3	AGRICULTURE BUILDING	NR
4	RINCON ANNEX	NR/SFL
5	AUDIFFRED BUILDING	NR/SFL
6	THE EMBARCADERO, 110-116	PE
7	EAST STREET IMPROV. CO	PE
8	HIHN-MEYER BUILDING	PE
9	EMBARCADERO INN	PE
10	EMBARCADERO YMCA	DE
11	SEAMAN'S INSTITUTE	PE
12	HILLS BROTHERS COFFEE	NR
13	PIER 22½	PE
14	PIER 24 BULKHEAD	PE
15	PIER 26 BULKHEAD	PE
16	PIER 28 BULKHEAD	PE
17	SAN FRANCISCO-OAKLAND BAY BRIDGE	PE
18	CABLE CAR SYSTEM	NHL/NR
19	BELT LINE R R	PE

SOURCE: E. M. Rose and Associates

HISTORIC RESOURCES

FIGURE 3.13-2

NHL	NATIONAL HISTORIC LANDMARK
NR	LISTED ON NATIONAL REGISTER
DE	DETERMINED ELIGIBLE FOR NATIONAL REGISTER
SFL	CITY AND COUNTY OF SAN FRANCISCO LANDMARK
PE	POTENTIALLY ELIGIBLE FOR NATIONAL REGISTER

800 FEET

the ten story structure is architecturally significant for its fine use of brick and terra cotta, and for its Renaissance/Baroque detailing.

AGRICULTURE BUILDING/FERRY STATION POST OFFICE, FOOT OF MISSION AT THE EMBARCADERO

Built as a U.S. Post Office in 1914-15 and transferred to the U.S. Department of Agriculture about 1930. Designed by A.A. Pyle of the State Department of Engineering, the building is a modified palazzo with Renaissance ornamentation of Mediterranean style.

RINCON ANNEX, 99 MISSION AT SPEAR

Designed by Gilbert Stanley Underwood and built in 1940, the Rincon Annex is a superb example of Work Progress Administration Moderne style of architecture. The interior features murals depicting scenes from California history. The building is currently the centerpiece of the Rincon Point-South Beach Redevelopment project and is being renovated to provide retail and commercial space.

AUDIFFRED BUILDING, 1-21 MISSION

The four story Audiffred Building, constructed in 1889, is the only remaining structure on the landward side of The Embarcadero that survived the 1906 earthquake and fire. Featuring a distinguished mansard roof and decorative brickwork, the Audiffred Building is one of the anchor buildings of the historic East Street Row.

110-116 THE EMBARCADERO

A two story brick building constructed in 1913. Part of the East Street Historic Row located between Howard and Mission, Steuart and The Embarcadero.

EAST STREET IMPROVEMENT COMPANY HOTEL, 128-132 THE EMBARCADERO

A five story brick hotel built in 1907, it forms a part of the East Street Row.

HIHN/MEYER BUILDING, 137-143 STEUART

A two story building designed by Ward & Bloehme and constructed in 1910. Used originally for commercial activities on the ground level and for residences above, the building has been renovated for retail and office uses.

EMBARCADERO INN, 144-146 THE EMBARCADERO

A four story brick hotel built in 1906. It forms part of the historic East Street Row that extends from Mission to Howard.

EMBARCADERO YMCA, 166 THE EMBARCADERO

This eight story brick building was designed by Carl Warner and constructed in 1925-26. The decorative detailing is in the Renaissance Revival style. The Embarcadero YMCA, a significant element in the historic East Street Row, has received grants from the Department of Housing and Urban Development for building rehabilitation through the Mayor's Office of Community Development.

SEAMAN'S INSTITUTE, 240-242 STEUART

Designed by Wright, Rushforth and Cahill and constructed in 1907. This Mission Revival style building currently houses offices.

PIER 22-1/2, FIREBOAT HOUSE

Designed by A.A. Pyle of the State Department of Engineering for the State Board of Harbor Commissioners, and constructed circa 1916, the Fire Boat House still functions as a fire station servicing Port of San Francisco facilities with the Fireboat Phoenix.

PIER 24 BULKHEAD

A Mission Revival style bulkhead designed in 1914 by A.A. Pyle of the State Department of Engineering for the State Board of Harbor Commissioners. Pier 24 was constructed in 1915.

PIER 26 BULKHEAD

A Mission Revivial style bulkhead designed in 1912 by A.V. Saph of the State Department of Engineering for the State Board of Harbor Commissioners and completed in 1913.

PIER 28 BULKHEAD

A Mission Revival style bulkhead designed in 1912 by A.V Saph of the State Department of Engineering for the State Board of Harbor Commissioners. Construction was completed in 1913.

SAN FRANCISCO-OAKLAND BAY BRIDGE

Constructed between May, 1933 and November, 1936. The major bridge designers were: Henry Purcell, Chief Engineer; Charles E. Andrew, Bridge Engineer; Glen B. Woodruff, Design Engineer; and Arthur Brown, Jr., Timothy Pflueger, and John Donovan, Consulting Architects. The bridge consists of two structures joined by a tunnel through Yerba Buena Island. The west crossing, between San Francisco and Yerba Buena Island, consists of two suspension spans anchored in the center to a concrete pier. This design is unique in bridge construction. The Oakland side combined two types of truss design with a cantilever span of 1,400 feet.

HILLS BROTHERS COFFEE PLANT, 2 HARRISON

Designed by George Kelham and built in 1926, the Hills Brothers building is a fine example of Romanesque style detailing applied to an industrial building. It still houses an operating coffee business and is the focus of redevelopment efforts in the South Beach area of the waterfront.

THE OLD AND NEW SEAWALLS

The Old Seawall was specified and designed as a part of the official William Eddy Red Line Survey of 1851 which defined the City boundaries. The Red Line Survey formed a series of 90 degree angles from Powell and Jefferson at the north to Jackson Street. From Jackson, the survey runs a straight line across to Folsom Street. The survey line continues from Folsom and angles to the southern boundary at a line extending from Corbett Street. Clark's Point, the northern boundary of Yerba Buena Cove, and Rincon Point, its southern boundary, are both covered by the survey grid. Therefore, the entire area of Yerba Buena Cove was contained within the survey grid defining San Francisco's boundaries. A government reserve of two submerged blocks between Washington and Jackson, Front and Drumm, is specified in these waterlot blocks. The City sold off the waterlots and leased the streets between the blocks to developers to provide needed shipping facilities for the booming gold rush port. The 90 degree angles of the seawall resulted in heavy shoaling.

The Old Seawall (not mapped) has not been evaluated for National Register eligibility by sources utilized in the preparation of Table 3.13-1. The New Seawall, built between 1887 and the late 1920s, was designed to eliminate the 90 degree angles of the Eddy Seawall line. The New Seawall design also permitted the expansion of land facilities of the Port of San Francisco. The New Seawall was constructed in phases. A 1,000 foot segment from Pacific to Clay was completed by May, 1889. The first segment to be built south of Market, to the foot of Mission, was completed in June, 1890. The section from Folsom to Harrison was finished by May, 1915. Substantial amounts of rubble were incorporated into the new seawall, particularly after the 1906 earthquake and fire. The area between the old seawall and the new, together with the East Street right-of-way, is known as The Embarcadero. It was, and remains, the public part of the Port utilized for moving people and materials to and from the ships, piers and warehouses. The New Seawall was completed approximately 75 years following the completion of the Eddy Survey of 1851 and the initiation of work on the Old Seawall.

BELT LINE RAILWAY RIGHT-OF-WAY

The Belt Line was constructed beginning in 1889 to handle cargo to and from San Francisco's growing port and to serve numerous industries along the waterfront. The Belt Line was unusual then, as now, in that it was a publicly owned railway. The Belt Line and the seawall were both instrumental to the development of the waterfront. The wide flat area known as The Embarcadero, created by the New Seawall, was naturally suited for the Belt Line railway tracks, with room for access to both warehouses and wharves. By the 1930s the Belt Line included 70 miles of tracks. During World War II, use of the railway peaked and trains were opeating around the clock. Since the war, use of the Belt Line has declined with the shift to containerized cargos. The Belt Line was considered a well planned and well constructed railway. Its integrity was reduced by the removal, paving over or deterioration of 40 percent of its original tracks. The Belt Line Railway has not functioned since 1985, but is still operational.

ACCESS TO HISTORIC SITES

Access to historical resources in the MUNI Metro Turnaround area is open for both motor vehicles and pedestrians. Access to the historic East Street Row block, the area closest to the constuction zone, is from both Steuart Street and the Embarcadero fronts. The heaviest pedestrian usage in the project area (6,000 to 8,000 persons per hour during peak periods) occurs between the Ferry

Building and the Justin Herman Plaza/Embarcadero Center area. Access between the Hills Brothers Coffee Building and the Hills parking lot located south of Folsom between Steuart and the Embarcadero results in regular pedestrian traffic across Steuart Street.

The current levels of pedestrian usage to and near historic sites in the project area is highest adjacent to blocks with the highest densities of development. The Ferry Building, Southern Pacific Building, Rincon Annex and East Street Row are among the historic properties in the project area with the highest levels of usage. Current development associated with the Hills Brothers Building will increase the level of pedestrian usage at this historic site. The Promenade is most actively utilized by workers from the Embarcadero Center/Ferry Building area during lunch and afternoon. The intense activity along the Promenade results in a high level of pedestrian usage in front of the Ferry Building, the Agriculture Building, and the historic bulkheads in the project area.

ARCHAEOLOGICAL RESOURCES

The 1977 report on preconstruction testing for the San Francisco Wastewater Program reports the results of boring tests along Steuart Street and in the Embarcadero areas south of Market. For the Steuart Street test borings, the greatest concentration of artifacts was found on Steuart between Howard and Harrison. These borings revealed "the greatest concentration of artifactual materials (as well as the oldest specimens)" of the entire south of Market Embarcadero area. Four hundred and seven artifacts were recovered in one auger hole at this location. These materials were located between 2 to 3 and 17 to 18 foot levels. In the Embarcadero area of the 1977 preconstruction testing program (between First and Spear) the corner of the Embarcadero and Main contained the densest concentration of artifacts. At this site the artifactual materials were found as deep as 26 to 27 feet below the surface. Borings taken at the intersection of the Embarcadero and Steuart Street, however, yielded only a small amount of materials (Pastron, 1977; 21-6; 84-132).

STORESHIPS IN SAN FRANCISCO

Gold Rush era businessmen often purchased old or abandoned ship structures and converted them into warehouses, stores, hotels, saloons, or restaurants by moving them to a lot or by leasing space at a pier or wharf. Presumably waterlots were the most convenient places to locate one's newly acquired storeship. This was done because building was prohibitively expensive during the gold rush years. Maritime Library research conducted by Marmon, Soeten and Kortum indicates that there were at least 164 storeships in San Francisco in July of 1952. An early observer found that:

> These ships had a very old, ruinous antiquated appearance, and at first sight, give me an impression that this new born city had been inhabited for ages and was now going to ruin (Maritime Library manuscript).

Most of the storeships were berthed north of Market because that portion of Yerba Buena Cove developed earlier than the south of Market blocks. However, as the Maritime Library listing included here indicates, according to newspaper accounts of the period, there were storeships in the south of Market area as well. The Roma and the Othello are the most likely to be located in the project APEI area. Table 3.13-2 lists the possible storeships and Figure 3.13-3 indicates the suspected location of these storeships.

TABLE 3.13-2. GOLD RUSH ERA STORESHIPS IN TURNAROUND STUDY AREA, NORTH AND SOUTH OF MARKET

This list was developed from 19th century newspaper accounts by Maritime Library researchers. All the ships indicated were business storeships except for the Panama which was utilized as a chapel. The Roma and the Othello are most likely to be found during construction activities.

Panama. Facing Davis Street. Davis, Drumm, Washington, Clay. Historical records indicate sure final disposition. Other records indicate the ship hull was absorbed into the Mission Street Wharf.

Elizabeth. Angled with the Clay Street Wharf off of the surveyed grid pattern. Drumm, Embarcadero, Washington, Clay. Historical records sure of this disposition.

Henry Lee. Ship bow facing California Street. Davis, Drumm, California, Sacramento. Historical sources unsure of final disposition.

Autumn. Facing the angle of Market on block between Davis, Drumm, California, Market. Unsure of final disposition.

Callao. Pointing up Pine Street at intersection of Market, Davis and Beale Streets. Sure of final disposition.

Bryon. Center of Market Street at intersection of Market, Davis and Beale Streets. Sure of final disposition.

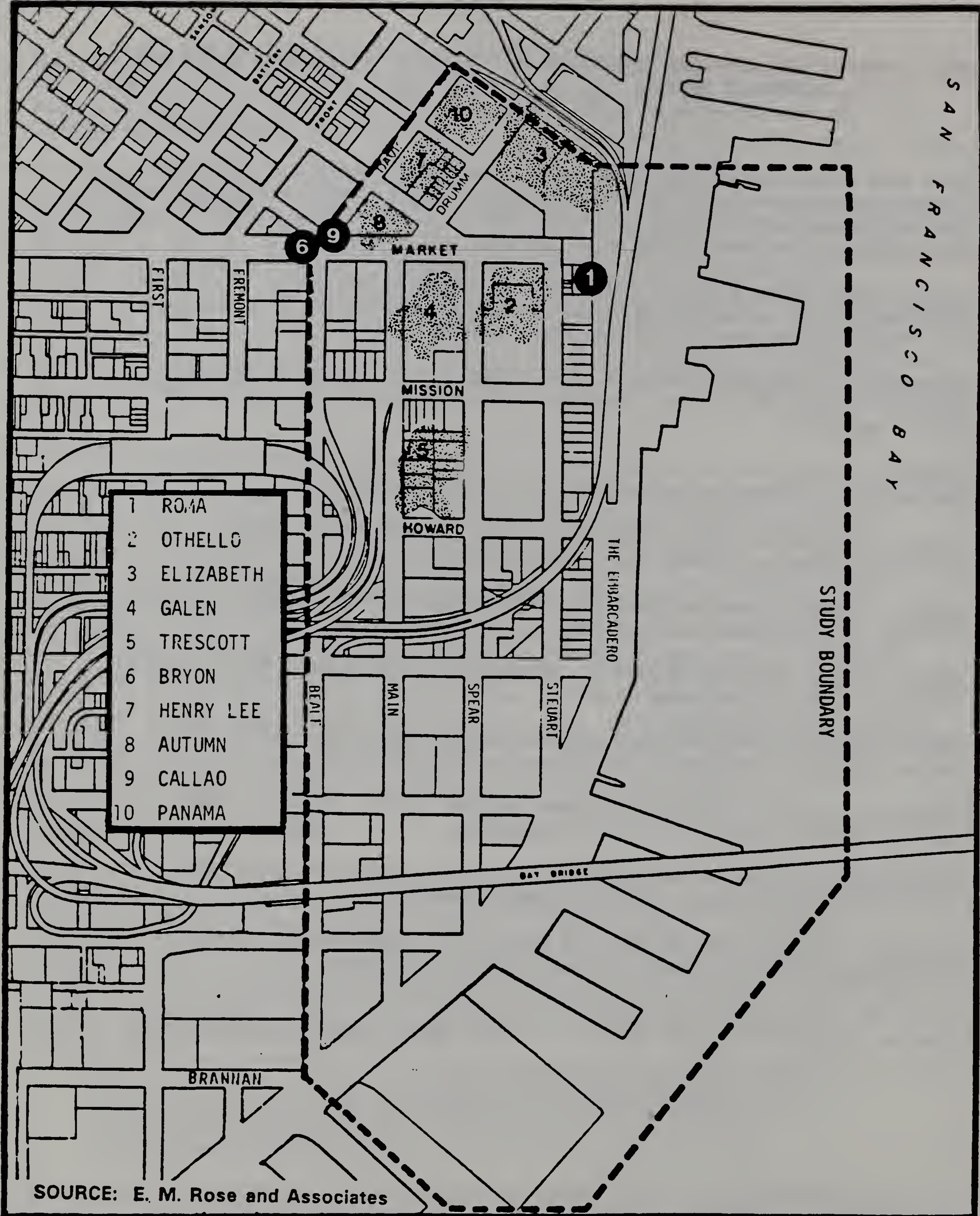
Galen. On lower side of Market Street, bow pointing west. Main, Spear, Market, Mission. Unsure of final disposition.

Othello. On Steuart Street lot, upper half of block. Steuart, Spear, Market, Mission. Unsure of final disposition.

Rome (Roma). Corner of East and Market off the street on a lot. East, Steuart, Market, Mission. Sure of final disposition.

Trescott. Intersection of Main and Mission, at angle pointed northeast. Main, Spear, Mission, Howard. Final disposition unsure.

Source: National Maritime Museum, J. Porter Shaw Library, San Francisco.


SAN FRANCISCO BAY
SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
MISSION
HOWARD
THE EMBARCADERO
STUDY BOUNDARY
BEALE
MAIN
SPEAR
STEUART
BAY BRIDGE
BRANNAN
1 ROMA
2 OTHELLO
3 ELIZABETH
4 GALEN
5 TRESCOTT
6 BRYON
7 HENRY LEE
8 AUTUMN
9 CALLAO
10 PANAMA
1
2
3
4
5
6
7
8
9
10

SOURCE: E. M. Rose and Associates

SUNKEN GOLD RUSH ERA STORE SHIPS

FIGURE 3.13-3

▨ GENERAL AREA OF ASSUMED LOCATION-FINAL DISPOSITION UNKNOWN

● KNOWN LOCATION OF FINAL DISPOSITION

SOURCE: NATIONAL MARITIME MUSEUM, J. PORTER SHAW LIBRARY, SAN FRANCISCO

800 FEET

3.14 PARKLANDS (SECTION 4(f))

3.14.1 APPLICABLE LEGAL AND REGULATORY REQUIREMENTS

Section 4(f) originates in the 1966 Department of Transportation Act (49 U.S.C. 1653(f)). Its mandate is to make special efforts to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and any historic sites. In response to that mandate the U.S. Department of Transportation (DOT) has developed a process to preserve publicly owned lands by requiring a comprehensive review of all impacts to natural, cultural and historic resources as a condition to project approval and funding authorization. More specifically, no program or project which requires the use of a historic site, of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance can be approved unless (1) there is no feasible and prudent alternative and (2) the project includes all possible planning to minimize harm to the property resulting from such use.

The vehicle by which this protection is provided is called a Section 4(f) statement, a detailed description of pertinent resources affected, impacts from project alternatives, and mitigation measures to minimize adverse effects. The Section 4(f) statement is circulated to Federal, State, and local agencies with jurisdiction over affected resources for their consultation and comment. After receipt of all comments a determination must be made by the lead Federal agency that there is "no feasible and prudent alternative" and that all possible mitigation measures are included.

A Section 4(f) analysis involving different levels of detail can be addressed in a tiered process. A first tier Section 4(f) evaluation has been formulated by DOT to address the preliminary planning stage when detailed information is not available. Since the action analyzed herein is the evaluation of four alternatives for transportation improvements for the MUNI Turnaround project and not a specific construction project, a first tier level evaluation is used. This evaluation compares the potential impacts of each alternative on Section 4(f) lands and whether the impacts could have a bearing on the decision to be made regarding selection of an alternative. Impact analysis is limited to general types of effects occurring if an alternative is implemented. Mitigation measures presented are also limited to actions appropriate at this stage of transportation planning. At the conclusion of the first tier impact evaluation, a preliminary determination is made as to whether any of the four alternatives can avoid use of Section 4(f) lands. If not, the potential for additional feasible and prudent alternatives which avoid the use of 4(f) land is evaluated. The preliminary determination shall consider all possible planning to minimize harm to Section 4(f) lands at first tier and subsequent planning stages.

Preparation of the first tier Section 4(f) determination will necessitate performance of final Section 4(f) evaluation at the time a specific transportation alternative is selected and proposed for the MUNI Turnaround project. However, the final Section 4(f) determination will be limited to the construction of a particular facility within the project area. Alternatives appropriate for evaluation of feasibility and prudence at that time would be a modified alignment which may avoid individual Section 4(f) lands. Mitigation measures for the final determination will be those specifically related to the proposed transportation alternative.

This Section 4(f) statement has been prepared concurrently with a Section 106 evaluation for historic and archaeological resources. Section 106 of the 1966 National Historic Preservation Act requires that impacts from federally assisted projects be examined for effects on all historic districts, sites, buildings, structures or objects and archaeological sites listed or eligible for inclusion in the National Register of Historic Places. The Act also requires that the Advisory Council on Historic Preservation be given the opportunity to comment on undertakings that affect such properties. A Section 106 evaluation is being prepared for historic and archaeological resources within the areas of potential environmental impact for the four MUNI Metro Turnaround alternatives. Information pertinent to Section 4(f) findings from the preliminary Section 106 historic survey and archaeological report has been incorporated into this Section 4(f) statement. (Refer to Section 3.13 of this Environmental Impact Statement for potential Section 106 involvement).

3.14.2 DESCRIPTION OF POTENTIALLY AFFECTED SITES

The following historic, archaeological, public park and recreational resources were considered for potential Section 4(f) involvement. These resources were selected based on 1) being at least partially located within the areas of potential environmental impact for the MUNI Metro Turnaround project alternatives and 2) having national, State or local significance. A historic site is significant only if it is on or eligible for inclusion on the National Register of Historic Places, or if the U.S. Department of Transportation (DOT) determines that Section 4(f) is appropriate. Section 4(f) applies to all archaeological sites on or eligible for inclusion on the National Register, including those discovered during construction, unless DOT in consultation with the State Historic Preservation Office and Federal Advisory Council on Historic Preservation determines a site is important chiefly for information it contains and has minimum value for preservation in place. Section 4(f) also applies to public land holdings that are significant for park and recreational uses. Findings of significance are made by City of San Francisco officials having jurisdiction over these lands. No wildlife refuges subject to Section 4(f) involvement are located in the MUNI Metro Turnaround project area of potential environmental impact.

PUBLIC PARKS AND RECREATIONAL LANDS

Table 3.14-1 lists significant recreational resources within the areas of potential environmental impact for one or more of the MUNI Metro Turnaround project alternatives. Figure 3.14-1 indicates the locations of these recreational resources. The recreational resources listed are the Justin Herman Plaza, the Bayfront Promenade, and the proposed Rincon Point Park. Information pertaining to these recreational resources was provided by the City Department of Parks and Recreation, the Port of San Francisco, and the Redevelopment Agency of San Francisco, respectively.

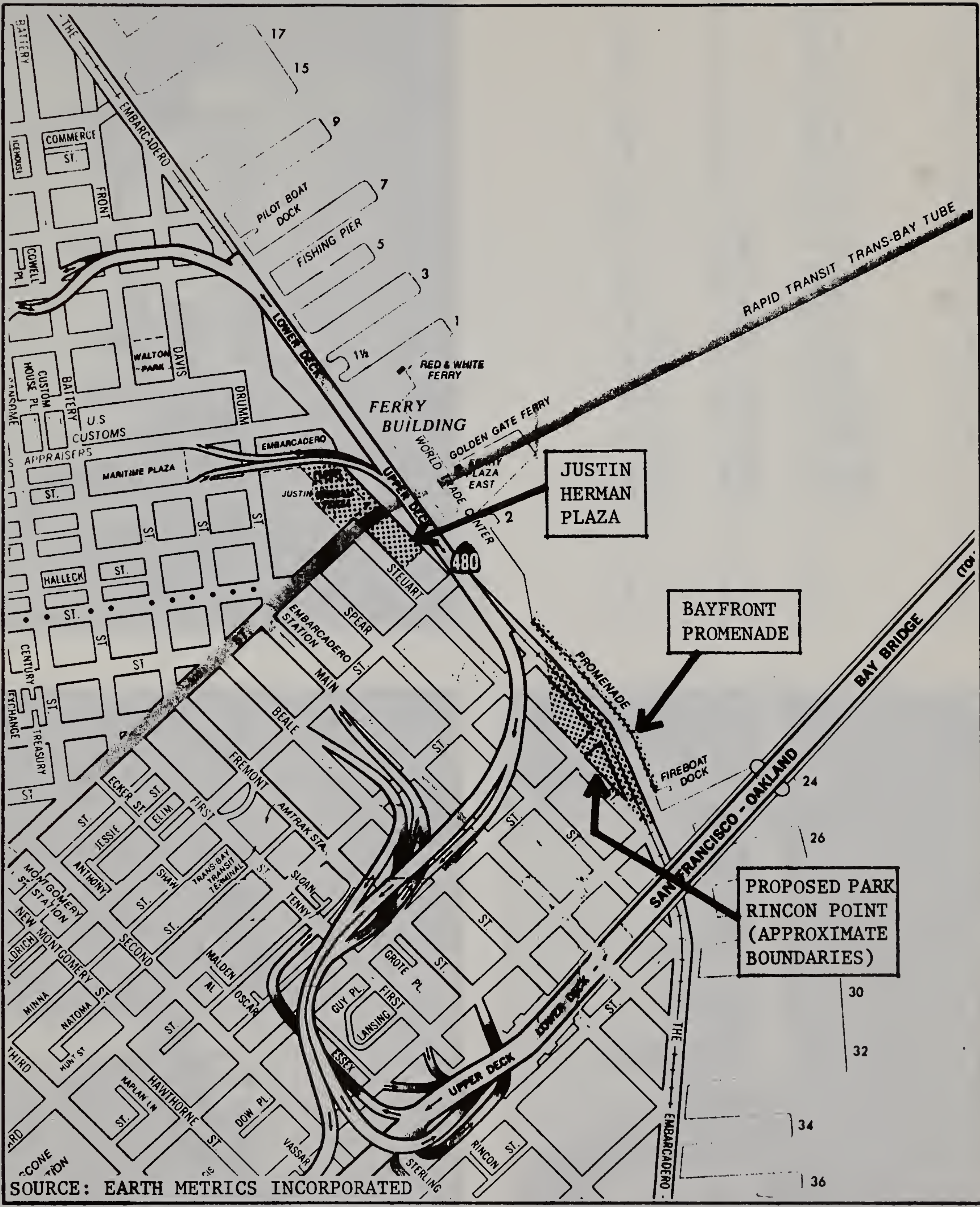
Justin Herman Plaza. Justin Herman Plaza is an existing, city owned park of approximately five acres. The park is located at the foot of Market Street along the Embarcadero from the MUNI bus turnaround to Washington Street (see Figures 3.14-1 and 3.14-2). Access to the park is provided from the streets surrounding the park such as Market Street, Mission Street, Clay Street, Washington Street and the Embarcadero Roadway. The park contains brick paved areas, landscaped trees and grass (detailed in Section 3.11, Biology), a pool with a free form sculptured fountain (Vallaincourt Fountain), which

TABLE 3.14-1. EXISTING AND PROPOSED PARKS AND RECREATION AREAS WITHIN THE AREAS OF POTENTIAL ENVIRONMENTAL IMPACT OF THE MUNI METRO TURNBACK ALTERNATIVES

RECREATIONAL FACILITY	AGENCY JURISDICTION	DESCRIPTION
Justin Herman Plaza	San Francisco Department of Recreation and Parks	A five acre L-shaped park and plaza located at the foot of Market Street along the Embarcadero from the MUNI bus turnaround to Washington Street. Contains brick paved area, landscaped trees and grass, and a pool with a free form sculptured fountain (Vallaincourt Fountain). Activities include concerts, political rallies, theatrical presentations, and picnicking during the noon hour.
Bayfront Promenade	Port of San Francisco	A pedestrian promenade of approximately 1,600 feet in length beginning at the foot of Mission Street near the Agriculture Building and extending to Pier 24. Activities include walking, viewing events such as boat races and fleet week, in addition to picnicking during the noon hour.
Rincon Point Park	San Francisco Redevelopment	A proposed 5.5 acre city park to be built in the area vacated by the Embarcadero Roadway (upon realignment) and on Assessor Blocks 3,742 and 3,743. This park would be adjacent to and inland of the Bayfront Promenade. Activities would include a play structure, a tot lot, indoor and outdoor dancing, and restaurants.

recirculates 30,000 gallons of water per minute, and an open air stage. The park was built in 1971 and is frequented by shoppers from the Embarcadero Center and people from the surrounding businesses who come to eat lunch. During the noon hour between 12 P.M. and 1:30 P.M. it is estimated that three to eight thousand people utilize the park (Ashe, 1988). Activities that take place at the park include concerts, political rallies and gatherings, and theatrical presentations. A portion of the park near Market Street is used by street artists which sell their handmade artwork (see Figure 3.14-2, Plate A). The park can be reserved for the activities mentioned above.

The months of May, October and September are good weather months for the use of the park and therefore many events take place in these months, even though there are year round events. The San Francisco Recreation and Parks


JUSTIN
HERMAN
PLAZA
BAYFRONT
PROMENADE
PROPOSED PARK
RINCON POINT
(APPROXIMATE
BOUNDARIES)
FERRY
BUILDING
RAPID TRANSIT TRANS-BAY TUBE
SAN FRANCISCO - OAKLAND BAY BRIDGE
THE EMBARCADERO
LOWER DECK
UPPER DECK
480
PILOT BOAT DOCK
FISHING PIER
RED & WHITE FERRY
GOLDEN GATE FERRY
FERRY PLAZA EAST
WORLD TRADE CENTER
PROMENADE
FIREBOAT DOCK
MARITIME PLAZA
EMBARCADERO
U.S CUSTOMS
APPRAISERS
WALTON PARK
EMBARCADERO STATION
AMTRAK STA.
TRANS-BAY TRANSIT TERMINAL
MONTGOMERY ST. STATION
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
SECOND
DRUMM
DAVIS
FRONT
BATTERY
COMMERCE ST.
CUSTOM HOUSE PL.
HALLECK ST.
CENTURY
EXCHANGE
TREASURY
ECKER ST.
ELIM
JESSIE
ANTHONY
SHAW
SLOAN
TENNY
MALDEN AL
OSCAR
GROTE PL.
GUY PL.
LANSING
ESSEX
RINCON ST.
STERLING
VASSAR
DOW PL.
HAWTHORNE ST.
KAPLAN LN
HUNT ST
NATOMA
MINNA
NEW MONTGOMERY ST.
THIRD
17
15
9
7
5
3
1
1½
2
24
26
30
32
34
36

SOURCE: EARTH METRICS INCORPORATED

N

SCALE
1" = 750'

FIGURE 3.14-1 LOCATIONS OF SECTION 4(f) PARK AND RECREATION AREAS

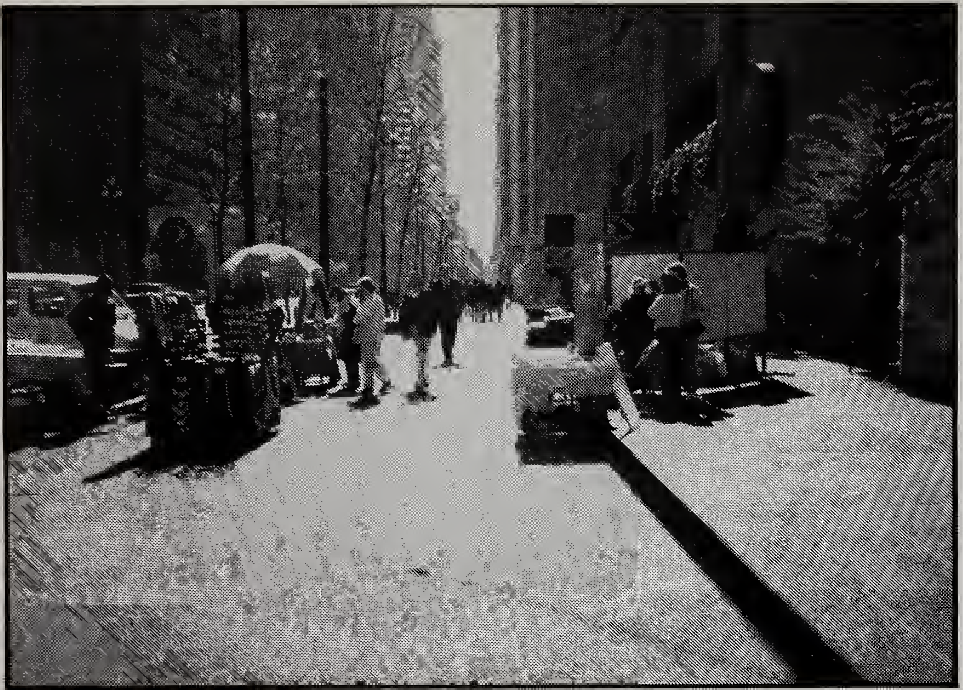


PLATE A:

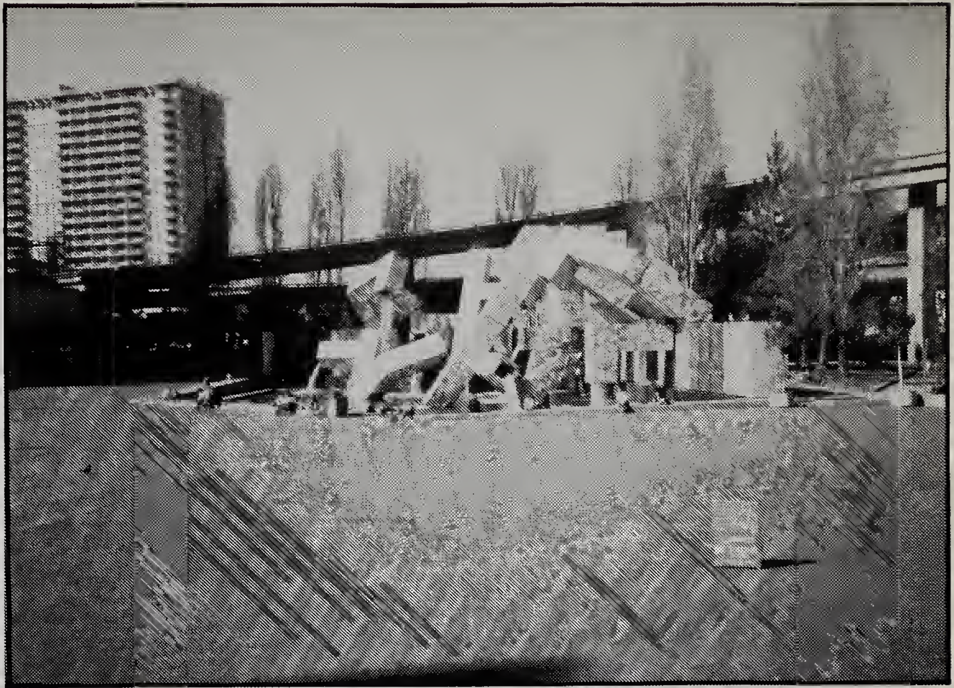


PLATE B:

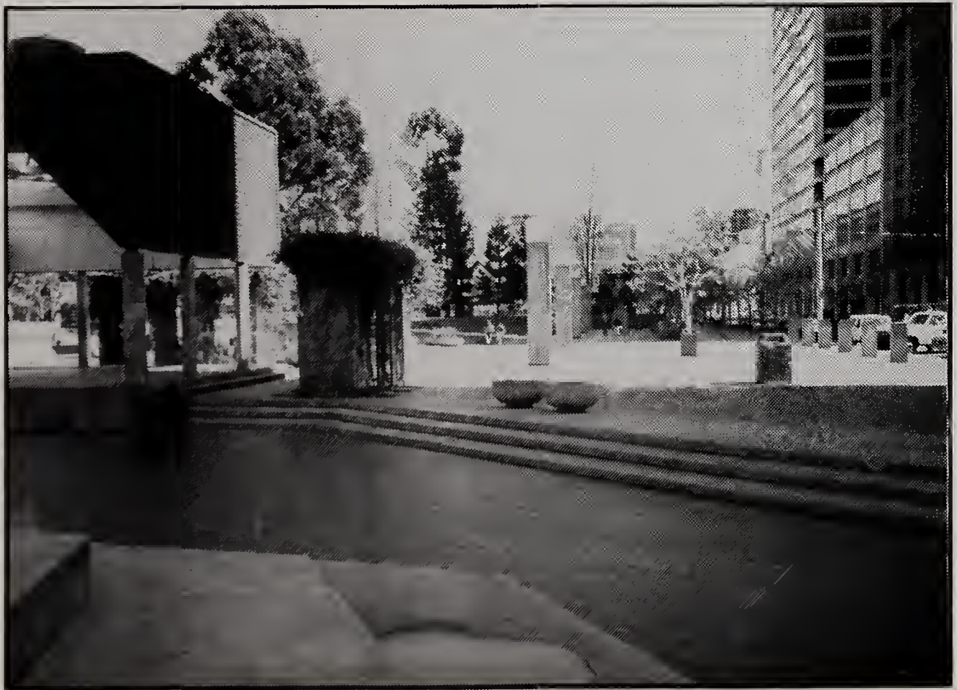


PLATE C:

PLATE A: VIEW OF STREET ARTISTS ALONG MARKET STREET FACING SOUTHWEST.

PLATE B: VIEW OF THE VALLA INCOURT FOUNTAIN WITH JUSTIN HERMAN PLAZA FACING NORTH.

PLATE C: VIEW OF JUSTIN HERMAN PLAZA FACING SOUTHEAST. NOTE THE THEATER STRUCTURE TO THE LEFT OF THE PHOTOGRAPH.

FIGURE 3.14-2 PHOTOGRAPHS OF THE JUSTIN HERMAN PLAZA

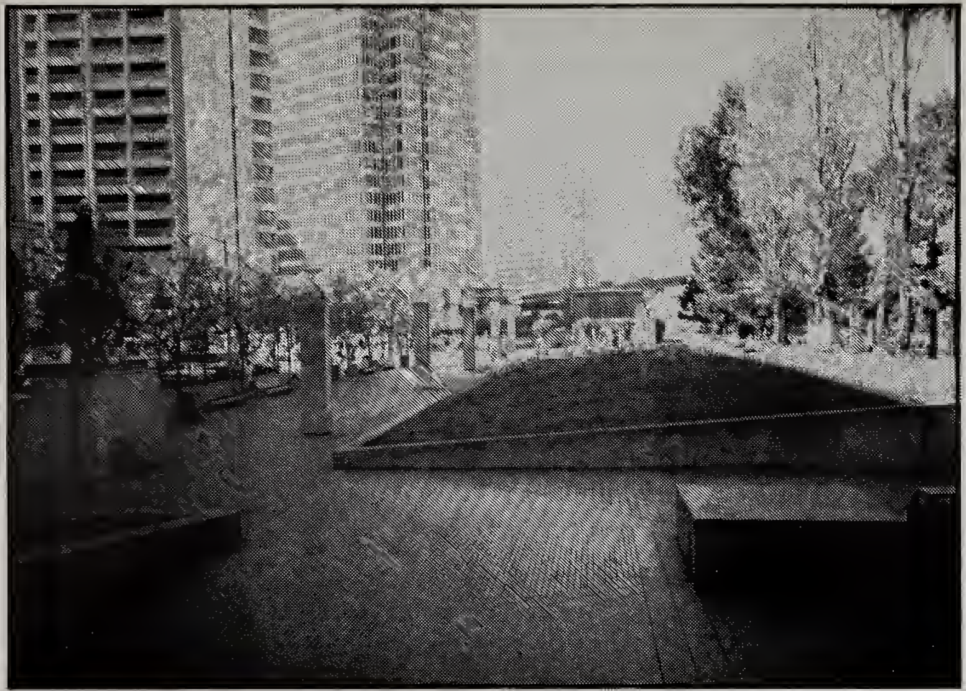


PLATE D:

PLATE E:

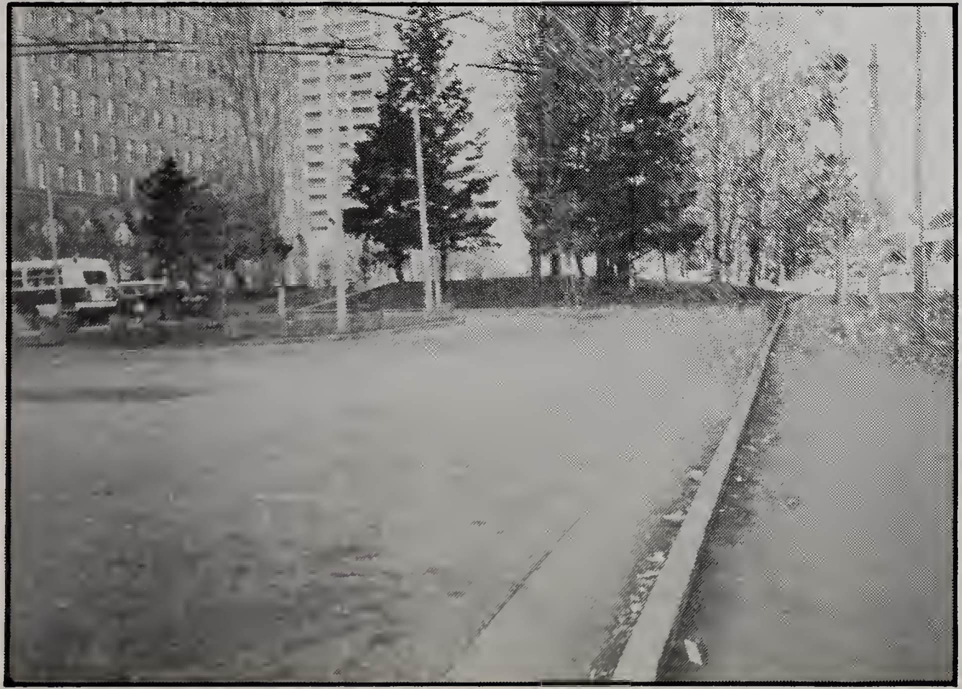


PLATE F:

PLATE D: VIEW OF THE PLAZA FACING NORTHWEST.

PLATE E: VIEW OF THE PLAZA FACING SOUTHEAST.

PLATE F: VIEW OF THE SOUTHERNMOST POINT OF THE PLAZA FACING THE NORTHWEST. IN THE FOREGROUND THE MUNI BUS TURNAROUND IS VISIBLE. TO THE RIGHT OF THE PHOTOGRAPH IS THE EMBARCADERO ROADWAY.

FIGURE 3.14-2 (CONT.) PHOTOGRAPHS OF THE JUSTIN HERMAN PLAZA

Department generates revenues from issuing permits for special events and also to street artists. The City Park and Recreation Department charges between $100 to $500 per event for the issuance of permits and use of park facilities (Ashe, 1988). The park is maintained by the Embarcadero Center.

Bayfront Promenade. The Bayfront Promenade is owned by the Port of San Francisco (State of California) and is a pedestrian promenade for the use and enjoyment of City residents and visitors alike. Starting just below the Ferry Building complex it runs in a straight axis for 1,200 feet before bending and introducing the piers of a still active south waterfront (see Figures 3.14-1 and 3.14-3). The total length of the Promenade is approximately 1,600 feet. The Promenade replaces Piers 14 through 22 which were some of the oldest and most obsolete piers on the waterfront (Rossi, 1988). Moorings off shore (approximately 20) are provided free of charge for day use of small crafts. Access to the Promenade is provided by the Embarcadero Roadway and also crosswalks at Mission, Howard, Folsom and Harrison Streets.

The Promenade, besides being a place where people can get to the water, is also thought of as a place where people on the water may get to the City. To this end, broad flights of steps go down into the tidal water.

Rincon Point Park. The Rincon Point park is a proposed 5.5 acre park to be built by the San Francisco Redevelopment Agency on Port of San Francisco property after rerouting the Embarcadero Roadway onto Steuart Street between Howard and Harrison takes place. Figure 3.14-1 shows the location of the proposed park, which is proposed for the area vacated by the Embarcadero Roadway and on Assessor Blocks 3742 and 3743, adjacent to and inland of the Promenade. The park will be oriented to the Bay and will relate to the recreational preferences of residents rather than tourists.

HISTORIC RESOURCES POTENTIALLY AFFECTED

The historic/architectural buildings are discussed in Section 3.13. A summary of the historic resources within the area of potential environmental impact is presented in Table 3.13-1. The location of these resources is illustrated by Figure 3.13-2. A comprehensive listing of historic resources in the general study area is presented in San Francisco Municipal Railway Turnaround Project Historical and Cultural Research to 1887, Reference Document No. 10.

Section 3.13.3 denotes small amounts of artifactual materials found in the study area as a result of preconstruction borings for the San Francisco Wastewater Program in 1977. Also identified are possible locations of buried storehouse ships, shown in Figure 3.13-3.

PLATE A:

PLATE B:

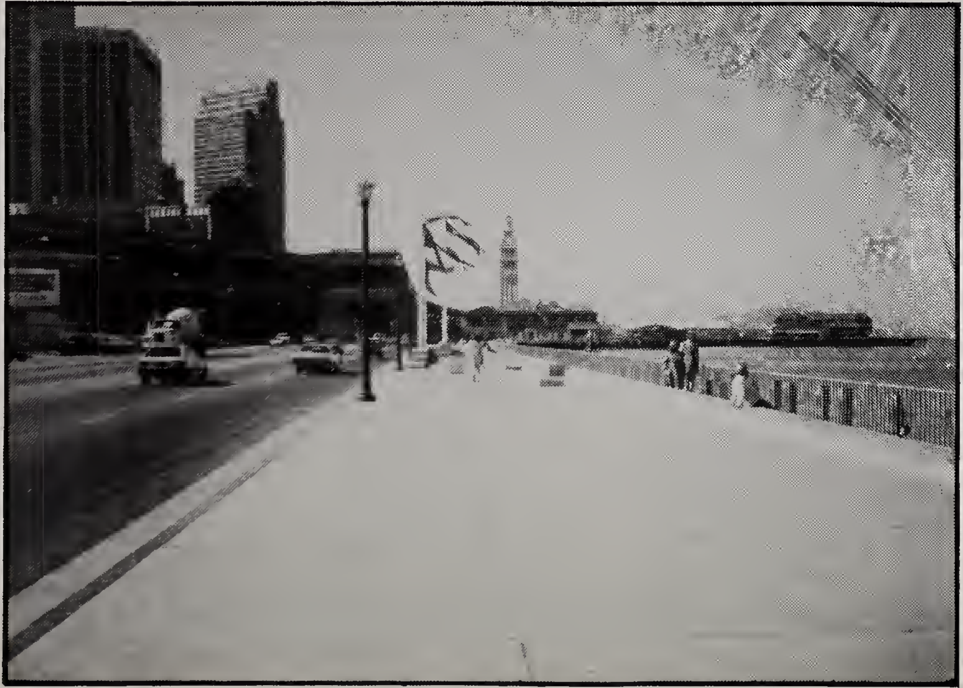


PLATE C:

PLATE A: VIEW OF THE EMBARCADERO ROADWAY ALONG THE BAYFRONT PROMENADE FACING SOUTHEAST CUT AND COVER CONSTRUCTION WILL TAKE PLACE WITHIN THE EMBARCADERO ROADWAY.

PLATE B: VIEW OF THE BAYFRONT PROMENADE STANDING ACROSS NORTHBOUND EMBARCADERO ROADWAY FACING THE BAY.

PLATE C: VIEW OF THE BAYFRONT PROMENADE FACING NORTH.

FIGURE 3.14-3 PHOTOGRAPHS OF THE BAYFRONT PROMENADE

CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES AND PROPOSED MITIGATION

This chapter provides an evaluation of the impacts of the Turnaround Project per alternative for each of the areas identified in Chapter 3, "Existing Setting". Because Alternatives 1 and 2, the Surface and Underground Alternatives respectively, are build alternatives, involving substantial construction and additional MUNI Metro operating requirements, their impacts are examined with much greater detail than Alternatives 3 and 4, the Transportation Systems Management and No-Action Alternatives. Often, there are no impacts related to Alternatives 3 and 4, and, if this situation occurs, the no-build alternatives are omitted from the discussion.

Impacts in Chapter 4 are distinguished between short and long term impacts. The time frame for short term impacts corresponds to the construction period. Therefore, short term impacts are basically construction related impacts. Long term impacts relate to the beneficial and adverse effects of project completion and turnback operation. The sole unmitigated significant impact involves visual intrusions during the construction period. Specifically, cut and cover excavation with portal construction will occur along The Embarcadero to Howard Street. The Underground Alternative will have slightly greater visual impact since excavation will continue south of Howard Street. Both build alternatives will require the use of disposal and other heavy equipment at the tunnel excavation site adjacent to the MUNI bus turnaround. Hoses necessary for grouting work will be emplaced for a three week period on the grassy knoll in the southern end of Justin Herman Plaza.

It is the intent of this chapter to identify all practical mitigation measures that can render an impact to a level of non-significance and to determine those impacts that are unmitigable. Additionally, since Alternatives 1 and 2 are very similar in concept, the differences between the two alternatives are emphasized, whenever appropriate. This format should help clarify the advantages of one alternative over another and present the requisite information for the public and local decision makers to choose a preferred alternative.

4.1 LAND USE, PLANNING AND PUBLIC POLICY

4.1.1 LAND USE

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction would most directly effect access to business along The Embarcadero, especially the East Street Row between Mission and Howard Streets. Vehicular access to Port of San Francisco facilities may be affected along the waterfront side of the project area.

Other land uses within the study area which may experience short-term construction impacts include the MUNI Bus Turnaround and Justin Herman Plaza. Refer to Section 4.4, Traffic and Transportation, for a discussion of the Bus Turnaround potential impact and Sections 4.3, Economic and Financial Characteristics; 4.9, Construction Methods; and 4.14, Parkland (Section 4f, Compliance); for a discussion of potential impacts related to Justin Herman Plaza.

LONG TERM. The alignment would not result in direct long-term impacts on the land uses north of Howard Street. However, the portal and the transition of the alignment from subsurface to surface at this location would change the existing character of the area below the freeway structure. This potential impact is discussed further under Section 4.5, Urban Design.

South of Howard, land use changes which would occur within the study area are associated with the Embarcadero Parkway project which provides a median for the Turnaround alignment. These land use changes are related primarily to the realignment of the Embarcadero Roadway to accommodate the proposed Rincon Point park. Existing land uses which would be affected by the realignment of The Embarcadero include the Port-owned surface parking area below the freeway, the adjoining wood-framed structure also on Port property, and the Marine Terminals Corporation property. These properties would be displaced by the Embarcadero Parkway and are referenced here for purposes of clarification. Impacts related to these properties and applicable relocation assistance programs would addressed by the Embarcadero Parkway Environmental Assessment.

Since the tracks for Alternative 1 extend an additional 2,200 feet to the south, the Surface Alternative would enhance future transit accessibility to adjoining land uses when considered in conjunction with the future MUNI Metro Extension. The turnback operation as proposed within the Embarcadero Parkway median between Harrison and Bryant Streets would not directly affect adjoining land uses. The Redevelopment Agency's South Beach Redevelopment Project includes the current construction of Bayside Village and the Embarcadero Plaza which are adjacent to the southern end of the Turnaround study area. These two medium- to high-density housing projects, together with the redevelopment of the Hills Brothers Coffee complex at Harrison and The Embarcadero, suggest the need for non-industrial uses or less intensive industrial uses on the piers between the Ferry Building and China Basin. Further, the City's Rincon Hill Plan specifies a pedestrian open space connection from a proposed high-density Rincon Hill housing district through the Hills plaza complex, to an Embarcadero open space and recreation area.

The turnback function of the Surface Alternative would be located in close proximity to the possible future industrial use of Pier 30-32; this industrial use will require truck and rail access. The function of the turnback near Pier 30-32 is such that it will primarily be used during peak periods; and will only involve rail vehicles in the location for short durations. However, when considered collectively in the broader context of other potential development, surface turnback operations could contribute to a future inconsistency between nearby impending and proposed city and privately-sponsored development and possible industrial use of Pier 30-32. See further discussion of Alternative 1 under Urban Design impacts.

Mitigation Measures

SHORT TERM. Emergency access and pedestrian access to affected properties would be maintained to buildings during the construction. East Street Row buildings have access from The Embarcadero and access from Steuart Street. Vehicular access would be maintained to Pier 22 1/2, the Fire Boat Station, and all Port of San Francisco pier facilities in the construction area. Mitigation could be provided for the loss of parking during construction.

LONG TERM. The intensity of future development of Pier 30/32 in conjunction with high density housing and commercial development in adjoining areas could impact surface turnback operations. The related impacts and mitigation measures which are associated with the right-of-way of the Embarcadero Parkway Project would be addressed by the Environmental Assessment for the Embarcadero Parkway.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Construction may result in settlement and cracking of the East Street Row building facades and features since the Underground Alternative alignment is closer to East Street Row.

LONG TERM. There is one principal difference in the long term land use impact of Alternatives 1 and 2. The Surface Alternative presents potential land use conflicts south of Folsom Street, particularly to Pier 30/32, which are not affected by the shorter alignment in the Underground Alternative.

Mitigation Measures

Construction procedures would include preconstruction surveys of affected buildings and structures as well as monitoring potential building settlement and cracking during construction. Construction procedures would be modified as required to minimize potential impact. Potential cracks in building facades and features resulting from construction will be repaired as required.

TRANSPORTATION MANAGEMENT SYSTEM ALTERNATIVE

Impacts

SHORT TERM. There would be no short-term land use impacts associated with Alternative 3.

LONG TERM. Transportation System Management measures provide minimal transit improvements which do not meet related planning objectives to increase peak service capacity of the MUNI Metro system.

NO-ACTION ALTERNATIVE

SHORT TERM. There would be no short term land use impacts related to Alternative 4.

LONG TERM. The No-Action Alternative is not consistent with San Francisco's Transit First Policy and with elements of the Comprehensive Plan. Peak service capacity cannot be improved under this alternative.

4.1.2 PLANS AND POLICIES

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. There are no short-term plans and policies impacts which have been identified for Alternatives 1 and 2.

LONG TERM. A number of City agencies will be directly and indirectly involved in the review, approval, and implementation of individual elements of this alternative. The San Francisco City Planning Commission and Department of City Planning review projects for their consistency with the Comprehensive Plan and, if appropriate, could amend the Comprehensive Plan to be consistent with the Turnaround Project. The Board of Supervisors would approve any implementing measures related to the Turnaround Project by resolution and/or ordinance. The Utilities Engineering Bureau (UEB) and MUNI would be implementing agencies for the proposed project. UEB and MUNI, which are under the jurisdiction of the San Francisco Public Utilities Commission, would be responsible for constructing and operating the Turnaround Project, respectively. The Department of Public Works would be responsible for City street modifications.

The San Francisco Comprehensive Plan Energy Element specifies energy-efficient transportation alternatives. The MUNI Metro is powered by electricity, a clean energy resource. The Metro transit system is also energy efficient, i.e., it requires less fuel per passenger mile than automobiles. The Environmental Protection Element goals and objectives are supporative of enhancements to the Metro system as the project would permit increased transit capacity of electrically-powered light rail vehicles. The Transportation Element establishes a policy of priority for public transit in San Francisco and advocates transit service improvements in the central city area. These goals and objectives would be advanced with the construction of the MUNI Metro Turnaround. The Central Waterfront Plan specifies the extension of the light rail vehicle route through the central waterfront along the Third Street corridor. Building the Turnaround would assist in the implementation of that plan goal.

The Downtown Plan specifies improvements to the MUNI Metro service as a key element in the City's capacity to absorb increased growth predicted in the Downtown Plan. The Turnaround Project was found to be essential for increasing peak service capacity on the MUNI Metro system.

The Northeastern Waterfront Plan specifies that improved public transit service be developed in preference to private vehicle facilities. The Rincon Hill Plan calls for enhanced public transit service to the Rincon Hill area. The South of Market Plan states that the area is deficient in transit service. All San Francisco plans and policies advocate improved transit service and favor expansion of MUNI Metro capacity.

The San Francisco Redevelopment Agency projects within the Redevelopment Agency's Rincon Point-South Beach project area are reviewed by the agency for conformance with the Redevelopment Plan. The Turnaround will be built adjacent to an area that will be developed into a waterfront park along The Embarcadero between Howard and Harrison. The Redevelopment Plan features: high density residential development on the Howard Street end of the Rincon Annex site, a proposed hotel bayside of the Embarcadero Freeway fronting on Folsom, and several blocks of high density residential development inland of The Embarcadero from Bryant to King Streets on six separate blocks. The Rincon Point-South Beach Redevelopment Plan encourages the extension of MUNI Metro rail service into the area. Alternative 1 would have a potential impact on the Hills Plaza redevelopment project and on the pedestrian accessibility and visual clarity to the waterfront from the Redevelopment Agency project housing areas.

The Turnaround Project area is within the Port of San Francisco jurisdiction for the two blocks of Steuart from Howard Street and for any portions of the Turnaround facility extending onto The Embarcadero at or near Harrison Street. The Port Commission Resolution No. 87-96 specifies guidelines for review, approval, and mitigation of public agency-sponsored projects on Port lands. Review and approval would be required at the schematic design review, working design review, and final review/contract documents stages. Compensation at fair market value could be required for the loss of Port revenues or lands. Port of San Francisco review will therefore focus on the impact of the Metro Turnaround Project on Port operations, revenues and lands. The Port is also responsible for consulting with the State Lands Commission to establish conformance with the public trust provisions of the Burton Act. Specific impacts on the Port include the partial loss of Port lands and parking revenues resulting from the Turnaround, Parkway, and Rincon Point Park projects.

The Port could either enter a lease agreement or make a land exchange (via a lease) for lands. The stipulation would be that these projects must not interfere with the Port of San Francisco's ability to manage the rest of its land for maritime purposes. Prior to any final decision, however, the Port would have to make two special findings under their Burton Act mandate: that the Port's public trust role in the management of State lands is not jeopardized by the Turnaround Project; and that the continued viability of rail service in the seaport sections of the waterfront area is not jeopardized by the Turnaround.

The San Francisco Art Commission was founded in 1932 to support and encourage community participation in performing and visual arts programs. It approves all works of art placed on City or County property and reviews the design of structures, viaducts, bridges and the like erected over or on any street or public place. The Commission's jurisdiction also encompasses all Port lands. The Art Commission has the responsibility to review the Turnaround Project.

Concerns addressed during the Commission's review would include the quality and appropriateness of both the type of building materials used and the civic and aesthetic merits of designs. This project is not subject to arts adornment and may not be eligible for Federal participation.

TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

The TSM Alternative provides minimal transit improvements which do not meet related planning objectives to increase peak service capacity of the MUNI Metro system.

NO ACTION ALTERNATIVE

The No-Action Alternative is inconsistent with San Francisco's Transit First Policy and with elements of the San Francisco Comprehensive Plan. Without the Turnaround Project, improvements to the MUNI Metro system and public rail transit in the downtown core area could not be improved.

4.2 SOCIAL AND COMMUNITY CHARACTERISTICS

4.2.1 RESIDENTIAL POPULATION AND AFFECTED SOCIAL GROUPS

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. None anticipated.

LONG TERM. The MUNI Metro Turnaround Project could have direct or indirect impacts on residential population growth and demographic trends within and outside the project area. For example, the Turnaround Project would provide additional capacity for the MUNI Metro system, particularly during peak periods. The added capacity is not anticipated to induce residential development along MUNI Metro routes, but it would provide improved access to the established downtown.

The MUNI Metro Extension could provide greater access and perhaps increase MUNI's share of the modal split along The Embarcadero and King Street Corridor (see Section 4.15, Secondary Impacts of the MUNI Metro Turnaround Project). Along this corridor, 2,900 housing units and the approximately 1.1 million square feet of office/retail development are contemplated not including Mission Bay. The project would benefit residents and office workers through the provision of high quality frequent Metro Service. However, it is not anticipated that Metro projects related to or resulting from the Turnaround Project will induce greater development than the Redevelopment and City Specific Plans envision.

Mitigation

None required.

TSM AND NO ACTION ALTERNATIVES

No significant direct impacts, although without the Turnaround Project access to MUNI Metro could not be provided by way of a southern Metro extension.

4.2.2 HOUSING

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. The construction of Alternatives 1 and 2 would not result in the removal of residential units. However, there is the potential of disturbance to the residents at the YMCA, which houses both transients and temporary residents (over 30 day rentals), due to the additional noise of the pile driving in the already noisy area. The additional noise would not cause the facility to close. If relocation takes place, it would be the choice of the residents.

LONG TERM. Improved access to public transportation by virtue of the MUNI Metro Extension would further the increase of the land value of residential and commercial developments in the project area. As land values rise in the study area, the few remaining low income housing units and "underutilized" commercial and industrial spaces in the project area may relocate. However, the construction of Alternatives 1 and 2 would provide transit opportunities to those who desire to rent or own housing in the project area, and could allow residents to choose not to own a car.

Mitigation

SHORT TERM. None required.

LONG TERM. None required.

4.2.3 TRANSPORTATION DISADVANTAGED

Impacts

SHORT TERM. None.

LONG TERM. Within the project area in 1980 two census tracts, 178 and 179, had large concentrations of transportation disadvantaged (defined as young, elderly, handicapped, poor people, and those who do not own automobiles, regardless of income). Within these census tracts, 90 percent of the households had no automobiles and 60 percent of their trips to work were either by public transportation or walking. For these transit dependent persons who are presently living and working or those who will move into the project area, improved services provided by Alternatives 1 and 2 in conjunction with an extension of MUNI Metro to Mission Bay will impact transportation disadvantaged residents positively.

4.3 ECONOMIC AND FINANCIAL CHARACTERISTICS

4.3.1 URBAN ECONOMY

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Construction of the project would create temporary employment in the trade industries over the three year construction period. The temporary employment would generate short term revenues to San Francisco and the region. Of the construction workers on major projects in San Francisco, 30 percent live in San Francisco and 70 percent live throughout the region.

Alternative 1, the Surface Alignment, and Alternative 2, the Underground Alignment, each require large construction expenditures, $60.8 million and $83.3 million, respectively. Alternative 1 would directly create approximately 860 person years of employment at one time, of which 207 workers would live in San Francisco and 602 would live throughout the region. Those workers' salaries would generate $42 million, of which approximately $9.3 million would be earned by San Francisco workers and $17,500,000 by workers throughout the region.

Alternative 2 would directly create approximately 1,170 person years of construction employment at one time, of which 351 workers would live in San Francisco and 819 would live throughout the region. These workers would generate $42 million in salaries of which San Francisco workers would generate approximately $12.7 million and workers throughout the region would generate approximately $29.7 million.

While working in San Francisco, regardless of their residency, it is estimated that each worker could spend nearly $1,300 in taxable expenditures during the construction phase. These expenditures could generate $13,800 from Alternative 1 and $18,800 from Alternative 2 in sales tax revenues to San Francisco based on sales tax rate of 0.125 percent.

All firms engaged in the construction of the proposed project would be required to pay payroll taxes on the salaries paid to workers on the job. The San Francisco payroll taxes are based on 1.5 percent of salaries paid to the workers. Alternative 1 workers' salaries would generate approximately $467,000 in payroll taxes and Alternative 2 would generate approximately $636,000 at full employment.

The construction expenditures of the proposed project would create secondary employment throughout the region. The construction of Alternative 1 is anticipated to create approximately 1,300 secondary jobs, and whereas Alternative 2 would create approximately 1,800 secondary jobs.

The employment and revenue impacts of Alternatives 1 and 2 are summarized in Table 4.3-1.

TABLE 4.3-1. CONSTRUCTION RELATED ECONOMIC IMPACTS OF THE SURFACE ALTERNATIVE AND THE UNDERGROUND ALTERNATIVE

ECONOMIC FACTOR	SURFACE ALTERNATIVE	UNDERGROUND ALTERNATIVE
Total Capital Cost (1)	$71,795,000	$91,883,000
Total Right-of-Way Cost	0	0
Total Labor Cost (2)	31,146,500	42,381,500
Direct Employment (3)	860	1,170
San Francisco	258	350
Region	602	820
Salaries Generated		
San Francisco	9,339,600	12,706,200
Region	21,806,900	29,674,800
Payroll Tax at 1.5 Percent of Salaries	467,200	635,700
Sales Tax on Employee Expenditures (4)	13,800	18,800
Construction Secondary Employment (5)	1,333	1,814
Total Employment	2,193	2,984

(1) The basis of these figures is described in the Cost Estimating of the MUNI Metro Turnaround EIS. All figures are 1988 dollars.

(2) Assumes 50 percent of construction cost is labor.

(3) Based on 1988 average annual construction employee salary of $36,200, Laborer's Master Agreement and Tunnel Master Agreement as of June 27, 1988.

Residential split of 30 percent in San Francisco and 70 percent in the region based on Downtown EIR Consultant's Report, Vol. 1, May 1983, page IV.D.4.

(4) Based on average annual employee expenditures of $1,287. 101 Montgomery Street Office Building FEIR, certified May 7, 1981, page 83, and tax rate of 1.25 percent.

(5) Construction employment multiplier of 1.55 based on San Francisco Bay Area Impact - Outpact Model 1967-1971.

TSM AND NO-ACTION ALTERNATIVES

Since neither of these alternatives requires construction or significant capital expenditures, their impact in terms of the urban economy are negligible.

4.3.2 FISCAL IMPACTS

4.3.2.1 GENERAL

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts. The use of annualized capital costs provides a means of comparing the total costs of the alternatives. The methods and factors are defined in the UMTA DRAFT "Procedures and Technical Methodology for Transit Project Planning" dated September, 1986.

Annualized capital cost is defined as the value of a constant annual payment over the life of the facility, where the sum of all the payments plus interest equals the construction cost of the facility. The annualized costs and the basis for the costs are shown in Table 2.4-2, 2.4-3, and 2.4-5.

Total cost for an alternative is calculated by adding the annualized capital costs to the annual operating and maintenance expenses as shown in Table 4.3-2.

TABLE 4.3-2. ANNUAL COST TO THE CITY AND COUNTY OF SAN FRANCISCO FOR SURFACE AND UNDERGROUND ALTERNATIVES (MILLIONS OF DOLLARS: 1988)

	ALTERNATIVE 1	ALTERNATIVE 2
Annualized Cost		
Fixed Facility	$6.140	$8.409
Rolling Stock	1.00	.720
TSM	.165	.165
Operation and Maintenance Cost	1.32	.87
TOTAL	$8.625	$10.164

4.3.2.2 PORT OF SAN FRANCISCO

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Since parking revenue is a major source of revenue to the Port of San Francisco, any loss of this revenue source could have a negative impact on the Port's ability to maintain its existing services and could jeopardize implementation of future plans. To this end, the design of Alternative 1 and Alternative 2 attempted to minimize the loss of Port parking spaces. Approximately 141 Port parking spaces (64 metered spaces, 77 monthly stalls and 30 motorcycle spaces) in the project area would be impacted during the construction of either alternative.

The construction of Alternative 1 would displace 120 parking spaces for up to 36 months; the resulting estimated revenue loss to the Port would be $152,000. The construction of Alternative 2 would displace 141 parking spaces for up to 40 months; the estimated revenue loss to the Port would be $371,300.

No loss of revenue to the Port from their restaurant leases or from other tenants due to the construction of either alternative is anticipated. Construction activities could indirectly cause the Port to lose revenue (i.e., from initial leases, repair of and development on deteriorating piers and percentages of gross sales).

The construction of Alternative 1 or Alternative 2 would block access to Harrison Street which may impact the planned development at Pier 24 by eliminating street access from the west. This and other proposed projects planned for the area may limit the development of underutilized Piers 24, 26 and 28, making it difficult for the Port to attract potential developers for those piers due to restricted automobile and truck access.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The Port of San Francisco may be compensated for loss of parking revenue based on San Francisco Port Commission Resolution No. 87-96. Additionally, the contractor needs to provide continued access across the cut and cover excavation to the Agriculture Building and Piers 24, 26 and 28.

4.3.2.3 RECREATION AND PARK DEPARTMENT

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Justin Herman Plaza, administered and maintained by Recreation and Parks, has become one of the big drawing spots in San Francisco, especially in the downtown area. The construction Alternatives 1 and 2 should cause no disturbance to restaurant activities at the Plaza.

Events are scheduled all year at the Plaza. Some construction activities, such as pile driving, excavation, trucking, and grouting may affect Plaza events.

LONG TERM. None are anticipated.

Mitigation

SHORT TERM. Construction activities should be scheduled to limit conflicts with scheduled events at Justin Herman Plaza.

4.3.2.4 MUNICIPAL RAILWAY

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. The temporary rerouting of trolley lines at the bus turnaround (Steuart/Mission) is expected to require $250,000 for new trolley wire.

LONG TERM. The difference in escalated capital cost between the two alternatives is $30.427 million (Surface Alternative, $81.691 million and the Underground Alternative, $112.118 million).* Yet the operating costs for Alternative 1 are greater than Alternative 2 and, over the life of the project, this cost difference may prove to be a drain on MUNI's financial resources.

The difference in operation and maintenance costs, assuming seven percent annual inflation, is summarized in Table 4.3-3. Over a period of 22 years beginning in 1993, the cumulative operation and maintenance costs would be over $31 million higher for the Surface Alternative than the Underground Alternative, balancing the lower capital cost of the Surface Alternative.

Additionally, since the turnback operation for Alternative 1 is exposed on surface track rather than underground as in Alternative 2, the Surface Alternative presents potentially greater risk for increased claims against MUNI and the City and County of San Francisco (i.e., personal injury claims, vandalism, and noise and visual intrusion claims by residences). Although the cost of these claims cannot be determined at this time, consideration of potential costs should also be included in the determination of the overall cost differences between the two alternatives.

---

* Both alternatives would require purchase of additional LRVs. The additional LRVs will require storage space over and above that available at the Green Light Rail Center. These costs are not included in the escalated capital cost estimate.

TABLE 4.3-3. ANNUAL CUMULATIVE OPERATION AND MAINTENANCE COST (MILLIONS OF DOLLARS)

YEAR	SURFACE ALIGNMENT	UNDERGROUND ALIGNMENT	CUMULATIVE DIFFERENCE
1 (1993)	1.85*	1.22*	.63
2	1.98	1.30	1.31
3	2.12	1.40	2.03
4	2.27	1.49	2.81
5	2.43	1.60	3.64
6	2.60	1.71	4.53
7	2.78	1.83	5.48
8	2.97	1.96	6.49
9	3.18	2.09	7.58
10	3.40	2.24	8.74
11	3.64	2.40	9.98
12	3.89	2.56	11.31
13	4.16	2.74	12.73
14	4.46	2.94	14.25
15	4.76	3.14	15.87
16	5.09	3.36	17.60
17	5.45	3.59	19.46
18	5.83	3.85	21.44
19	6.24	4.12	23.56
20	6.67	4.40	25.83
21	7.37	4.70	28.50
22	7.64	5.04	31.10
23	8.17	5.39	33.81
24	8.74	5.77	36.85
25	9.36	6.17	40.04

* 1988 expenses from Table 2.5-1 have been inflated at 7 percent per year to arrive at 1993 O&M costs.

Source: Manuel Padron and Associates, 1985.
Luther Freeman, Municipal Railway, 1988.

4.4 TRAFFIC AND TRANSPORTATION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Short term traffic and transportation impacts of the Surface Alternative are directly related to construction. They will occur as a direct consequence of street opening for cut and cover and bored tunneling. Their duration is related to the sequencing of construction operations which require underpinning of the Embarcadero Freeway structure and the construction of slurry walls to form the tunnel structure.

In the area of construction, through north/south vehicular traffic utilize the Embarcadero Roadway. Steuart Street provides localized north/south access. The Embarcadero has two through lanes northbound and two southbound. These will be maintained during the construction period by shifting the two southbound lanes from their location through the west column bay of the freeway structure to the east column bays (see Figure 4.4-1). This pattern will be maintained during the period of relocation of utilities, construction of struts for tying freeway columns, and installation of street decking, and will require about five months. During this period, the separate southbound dedicated right turn lane to Mission Street will be closed. The two northbound Embarcadero Roadway lanes will not be directly affected by construction operations. East/west traffic to and from The Embarcadero at Mission Street will be maintained by decking the cut and cover excavation.

Steuart Street between Howard and Harrison Streets and The Embarcadero between Harrison and Main Streets would be an area of at grade construction. The Steuart Street construction would occupy a small portion of the westerly side of the road and would allow maintenance of roadway capacity. The Embarcadero construction would occur in an area where the paved roadway has sufficient width to permit maintenance of two lanes in each direction.

Access to the Ferry Building and the Agriculture Building would not be directly affected since the northbound Embarcadero Roadway lanes are not altered. The Audiffred Building, the YMCA and other buildings along the east side of The Embarcadero between Mission and Howard Streets would not be directly accessible for southbound traffic since the third southbound lane would be closed for about five months.

Emergency vehicle access would be basically unchanged except during the few hours when the switchover of southbound lanes between the east and west freeway column bays occurs.

Pedestrian traffic is primarily confined to the Ferry Building and the Agriculture Building areas. The access route from the foot of Market Street to the Ferry Building would not be affected by the construction. However, access along The Embarcadero at Mission and Howard Street intersections, which could be impeded by cut and cover and at-grade construction, would be decked to provide pedestrian access to the Bayfront Promenade.

Some parking spaces beneath the Embarcadero Freeway structure would be temporarily lost due to a change in alignment of the southbound Embarcadero Roadway lanes. Approximately 120 spaces would be lost during construction for about 36 months.

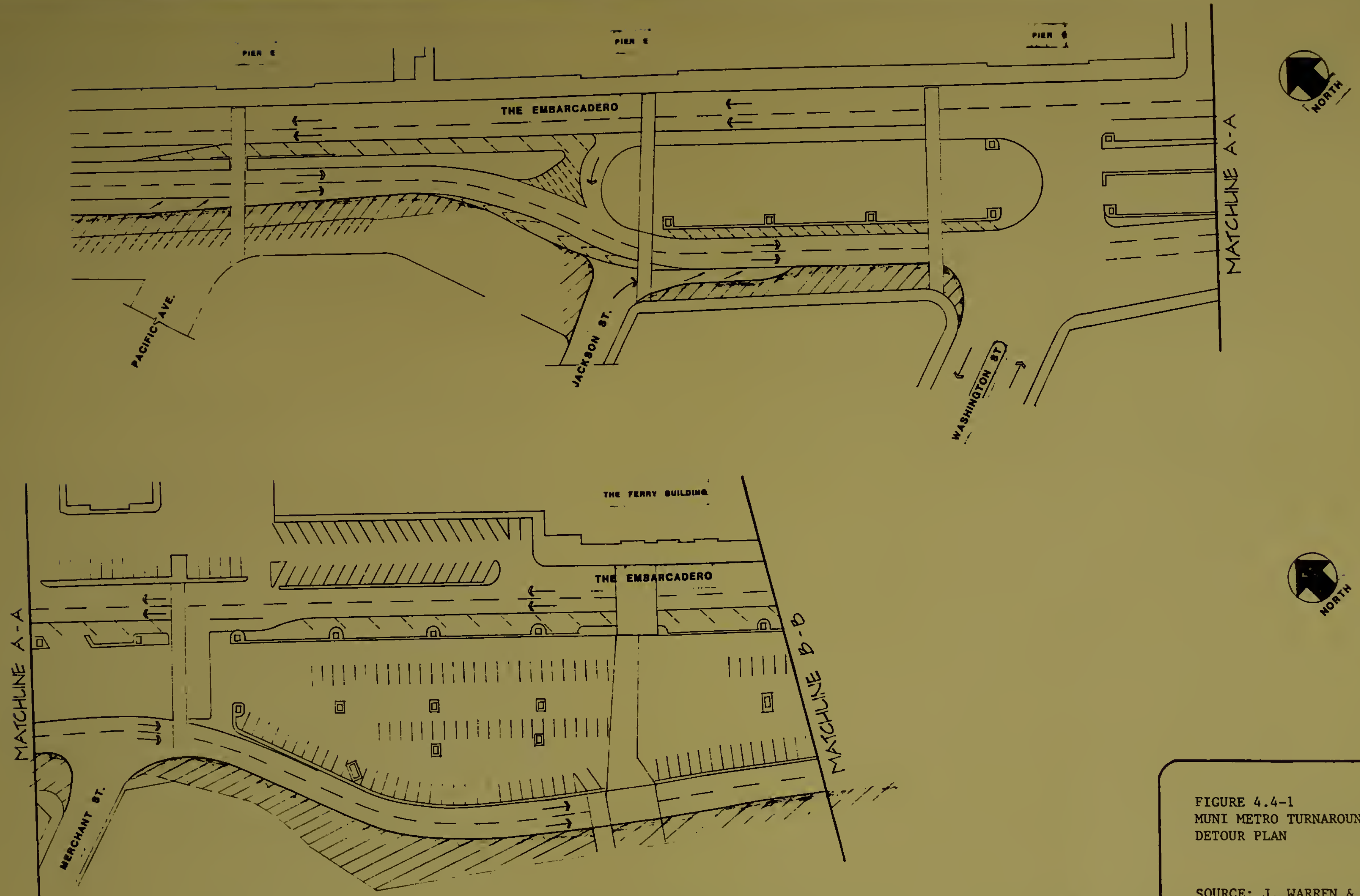

PIER ℄
PIER ℄
PIER ℄
THE EMBARCADERO
MATCHLINE A-A
NORTH
PACIFIC AVE.
JACKSON ST.
WASHINGTON ST.
THE FERRY BUILDING
THE EMBARCADERO
MATCHLINE A-A
MATCHLINE B-B
NORTH
MERCHANT ST.

FIGURE 4.4-1
MUNI METRO TURNAROUND TRAFFIC
DETOUR PLAN

SOURCE: J. WARREN & ASSOC.

Since major street circulation patterns and capacity would be maintained throughout construction, no major rerouting of MUNI lines would occur, although southbound bus stops on The Embarcadero at Mission and Howard may be affected and need to be temporarily discontinued or relocated. Tunnel excavation would disrupt use of the current MUNI bus turnaround at Mission and Steuart Streets and would require rewiring of the portion of the turnaround unaffected by construction.

LONG TERM. In this alternative, MUNI Metro would operate on surface tracks in the median of the new Embarcadero Parkway from the north side of Howard Street to the north side of realigned Bryant Street. The turnback of trains would occur on the surface at two locations; on a single side track between Howard and Folsom Streets, and on one of two side tracks between Harrison and Bryant Streets. This surface location for turning trains is the principal physical difference between the two build alternatives.

The location of the surface tracks and the turnaround operation would require modifications to the existing traffic plans. These modifications, along with analysis and recommendations, are described in Attachment "B" of Reference Document No. 9 and are refined in Reference Document No. 5.

This alternative would affect the layout and traffic at four intersections of the proposed Embarcadero Parkway:

> Howard Street. The proposed Metro tracks would reach surface level prior to Howard Street. The visibility of approaching trains exiting the portal would be limited and, to reduce the potential for conflicts with autos, the median at Howard Street would need to be closed.
>
> Folsom Street. Folsom would remain an eastbound one way street with both right and left turns allowed onto the Embarcadero Parkway. The median would be open across the MUNI tracks for this left turn movement.
>
> Harrison Street. The median at Harrison Street would be closed because the slow speed of trains reversing direction would block traffic. In addition, a northbound left turn lane in The Embarcadero would not be possible due to the restricted right-of-way width.
>
> Bryant Street. There are a number of redevelopment proposals in the vicinity of Bryant and Main Streets. The existing low intensity uses are expected to be replaced by multilevel structures and the facilities on the currently unused Pier 30/32 are planned to be rebuilt. It is desirable to rationalize the movements to and from the pier and enable consolidation of the redevelopment sites by constructing a new intersection and road segment to replace both Bryant Street and Main Street intersections. The new intersection would require turning bays, which could only be provided south of the turn back because of the available roadway width. The turning bays would dictate locating the new intersection south of the existing intersection. The implications of this intersection alignment on access to Pier 30/32 is currently being studied by the Port of San Francisco.

Coordinated traffic signals are proposed for all intersections in the Embarcadero Parkway project. In addition, the signals at Folsom and Bryant (when the southern extension is operational) must be integrated with Metro operations.

The expected future (year 2000) traffic volumes at the intersections were estimated based on existing volumes which were adjusted to account for the median closings at Howard and Harrison, and then were increased by a factor of 20 percent to account for expected general traffic growth in this area by the year 2000. Additionally, the P.M. peak traffic related to the redevelopment of Pier 30/32 was incorporated based on estimates of daily trip patterns provided by the Port of San Francisco. The projected year 2000 P.M. peak hour turning volumes are shown in Figure 4.4-2; the Level of Service anticipated due to traffic growth with and without Port development at Pier 30/32 and MUNI Metro surface turnback operation is presented in Table 4.4-1.

TABLE 4.4-1. PROJECTED YEAR 2000 LEVEL OF SERVICE ALONG THE EMBARCADERO

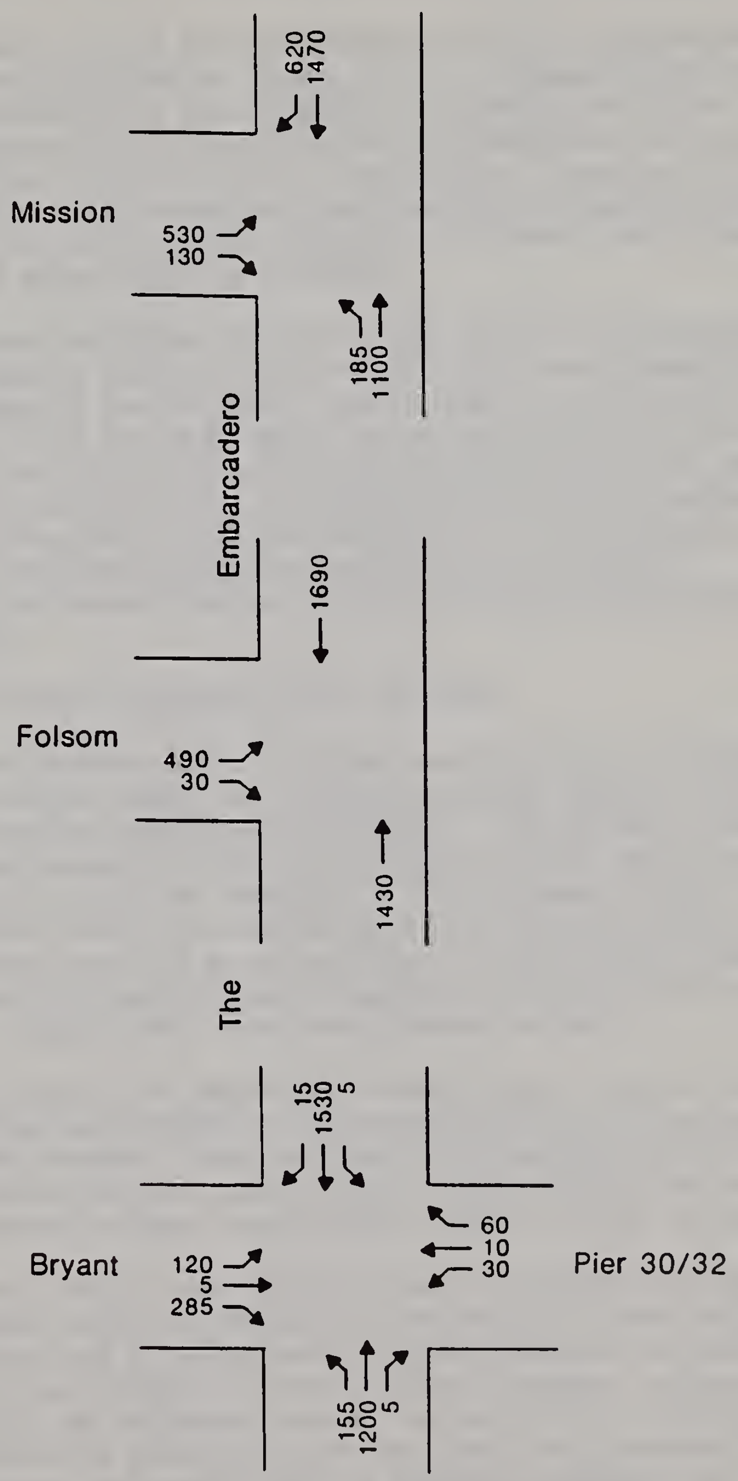
	DUE TO TRAFFIC GROWTH		DUE TO TRAFFIC GROWTH, INCREASED ACTIVITY AT PIER 30/32, AND MUNI METRO SURFACE OPERATION	
INTERSECTION	V/C	LOS	V/C	LOS
Embarcadero/Mission	1.05	F	1.25	F
Embarcadero/Folsom	0.76	C	.89	D
Embarcadero/Bryant	0.56	A	.70	C

Source: DKS Associates, 1986.

Table 4.4-1 indicates that growth in traffic is anticipated to deteriorate traffic conditions at Embarcadero/Mission to Level of Service F. The stop and go conditions could cause serious travel delays, particularly given the possibility of additional Port-related traffic and the closure of The Embarcadero/Howard intersection to left turning traffic as required in the Surface Alternative. Similarly, Embarcadero/Harrison and Embarcadero/Bryant could also be expected to have diminished Levels of Service. However the reduced Levels of Service, from C to D at Folsom Street and from A to C at Howard Street, would still allow traffic flow without excessive delays, i.e., over 40 seconds. Drivers may have to wait through more than one signal change.

Both the Embarcadero Parkway traffic and the Metro surface operation will impact pedestrian movements between the Bayfront Promenade and new Rincon Point park and the rapidly developing area to the west. Surface turnback operations would also detract from the parkway character.

Proposed Metro operations of 30 trains per peak hour per direction is defined in Chapter 1. The capacity and reliability of this Metro operation on the surface will be impacted by the crossing of traffic at Folsom Street and of pedestrians at every intersection. Currently, the maximum number of Metro trains operating in mixed traffic is ten trains per hour on the J, L, and N lines.



620
1470
Mission
530
130
185
1100
Embarcadero
1690
Folsom
490
30
1430
The
15
1530
5
60
10
30
Bryant
120
5
285
Pier 30/32
155
1200
5

SOURCE: DKS ASSOCIATES

FIGURE 4.4-2
YEAR 2000 DESIGN VOLUME
P.M. PEAK HOUR

Mitigation

SHORT TERM. In order to mitigate construction related impediments to circulation in the project area, the following mitigation measures are proposed:

- Through traffic movements along The Embarcadero should be maintained during construction as indicated in Figure 4.4-1. Intersections along the cut and cover excavation in the Embarcadero Roadway should be covered (decked) temporarily to allow vehicle and pedestrian circulation to the activities along the waterfront. Specifically, decking of the Mission Street/Embarcadero intersection would provide access to the Agriculture Building and the Bayfront Promenade. Access across The Embarcadero at Howard should also be provided.

- Continued access to the buildings along the east side of The Embarcadero between Mission and Howard Streets, particularly for pedestrians and emergency vehicles, should be provided. Additionally, a temporary, substitute turnaround loop for MUNI buses using the portion of the existing turnaround facility at Mission and Steuart Streets not used for construction needs to be installed. Interim facilities for operator layovers should be relocated to outbound terminals. No alternative routes would be required since temporary detours and decking of excavated areas will allow maintenance of basic traffic circulation patterns and capacity.

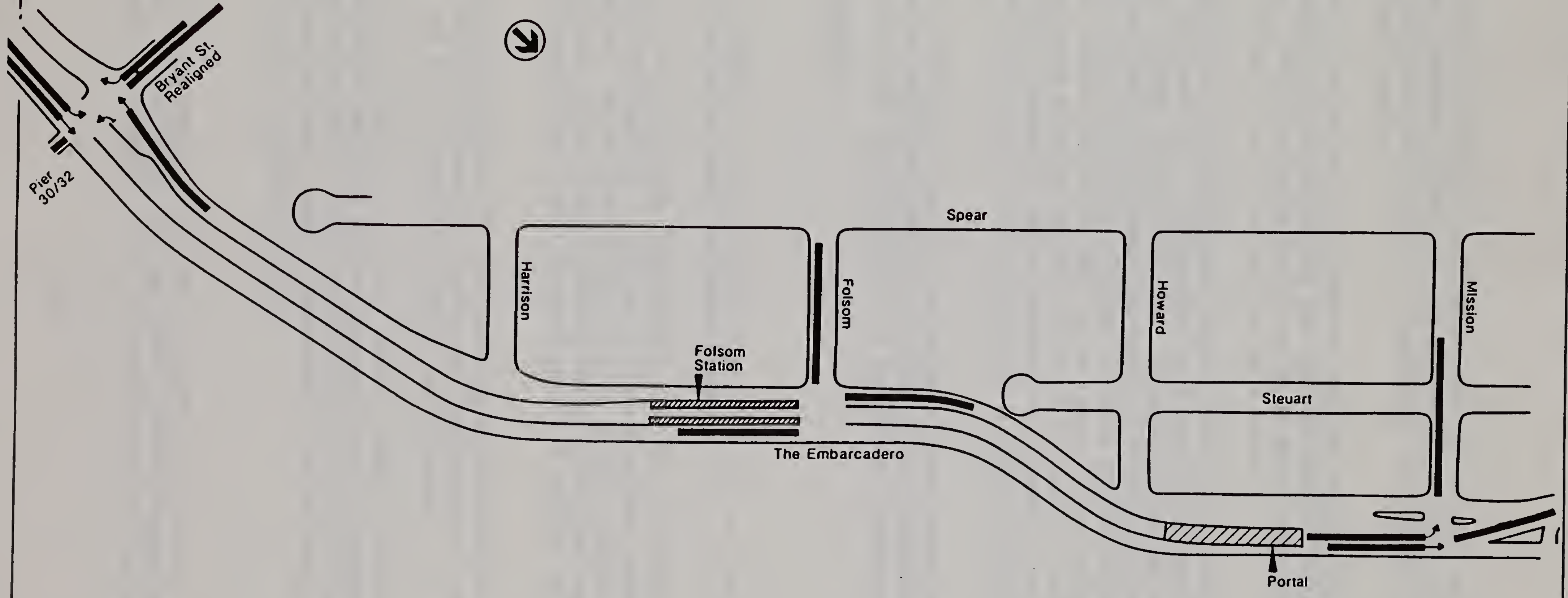
LONG TERM. The following traffic diversions are proposed:

- The realignment of The Embarcadero at Folsom would result in increased demand for left turns into Howard and Mission, because direct access to Steuart would no longer be possible from Folsom. This demand of left turns from Folsom into Steuart Street was projected to be as large as 120 vehicles per hour in the P.M. peak hour. Since Howard Street would be closed at Embarcadero and since existing left turns into and out of Howard Street are very light, 30 to 50 vehicles per hour, this demand could be accommodated at Mission Street. However, in this scenario, Mission Street would require two turn lanes instead of one.

- The projected evening peak hour volume (25 vehicles per hour) of left turn movements from The Embarcadero to Harrison Street could be readily accommodated at Bryant Street. The left turn onto Harrison Street is projected to be 75 vehicles/hour in year 2000. This traffic could be diverted to Folsom Street without significant impact on that street.

Analysis has shown that good traffic coordination can be provided for auto traffic along The Embarcadero while providing full priority for MUNI Metro. This coordination can be achieved by using modern microprocessor controllers with vehicle loop detectors and density control (senses presence and numbers of cars), to ensure flexible and efficient use of the green time. This arrangement would be satisfactory with 30 trains per hour per direction at Folsom Street and would reduce the possibility of excessive queuing and delays. The extent of queuing resulting from preempted signalization in favor of MUNI Metro is shown in Figure 4.4-3.

SOURCE: DKS ASSOCIATES


Bryant St. Realigned
Pier 30/32
Harrison
Folsom Station
Folsom
Spear
Howard
Steuart
Mission
The Embarcadero
Portal

30 trains per hour at Folsom
20 trains per hour at Bryant

FIGURE 4.4-3
MAXIMUM QUEUING WITH FULL PRIORITY

Metro train speed between Howard and Bryant would be reduced to ten mph to minimize possible accidents with cars and pedestrians. Road closures for emergency vehicles would be provided to compensate for median closures at Howard and Harrison Streets.

A maximum number of trains would be reversed between Howard and Folsom Streets to reduce the number of trains passing the intersections of Folsom and Harrison Streets. Prior to operation of the MUNI Metro Extension, at least half of the trains would be turned back on this track.

Pedestrian crossings of the Embarcadero Parkway would be controlled by walk signals at each intersection. Independent crossing of the MUNI tracks would be controlled by standard transit/railroad flashing lights and bell activated by an approaching train. The preemption analysis at Folsom Street indicated that an adequate pedestrian crossing phase would be available for independent crossings of the traffic lanes and MUNI Metro tracks. The cross traffic signal for pedestrians would be scheduled for 30 seconds of each 80 second cycle. The analysis indicated that an average of 15 seconds per cycle would be available over the two hour peak period with a random arrival of trains in both directions.

The Folsom Street preemption analysis indicated a three second average delay per train over a two hour peak period. This delay is insignificant when compared with the average total delay of 71 seconds per eastbound train.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The impacts of the Underground Alternative are similar to those of the Surface Alternative except as noted below.

The longer area of cut and cover construction will extend through the Howard Street/Embarcadero intersection. This will require a short term closure until decking is installed. Since the surface portion of the trackbed terminates short of the intersection of Steuart and Folsom Streets, the impacts to traffic flow on Steuart Street will be confined to a segment of approximately one block.

In the Underground Alternative, 141 Port parking spaces would be displaced for a longer period of time, 32 months, because of the larger cut and cover excavation area and time required for subway construction.

LONG TERM. In this alternative, the only surface Metro operation would involve moving disabled vehicles to the storage track. This move would have no adverse impact on traffic. Additionally, this alternative allows Howard and Harrison Streets to remain open at Embarcadero and eliminates the need for a double left turn lane at Mission Street.

Mitigation

SHORT TERM. Mitigation measures for the Underground Alternative are the same as in Alternative 1. The longer cut and cover section through Howard Street will require additional decking of the Howard/Embarcadero intersection in this alternative. However, the Underground Alternative does not extend as far south as Alternative 1 and, therefore, will have somewhat less traffic related impacts south of Howard Street.

LONG TERM. None required.

TSM AND NO ACTION ALTERNATIVES

Impacts

SHORT TERM. None.

LONG TERM. The existing turnaround facility will not be able to accommodate sufficient levels of service to meet projected peak demand. As a result, increased numbers of auto trips may occur in downtown San Francisco, resulting in greater congestion, decreased levels of service, and increased, localized air pollution.

4.5 URBAN DESIGN

4.5.1 INTRODUCTION

The urban design impact and mitigation analysis examines the project alternatives relative to the aesthetic and functional relationship between the waterfront and the inland City side of the project area. This evaluation draws on subjects addressed in greater detail in other sections of this report. These subjects which are brought together in the urban design section include transit operations, pedestrian and vehicular circulation, views, land use compatibility, construction impacts, parklands and historical resources. These issues are inherent in various related waterfront studies, plans and development program goals such as the Northeastern Waterfront Plan, I-280 Transfer Concept EIR, the ongoing Embarcadero Parkway Urban Design Study and the MUNI Metro Turnaround Embarcadero Urban Design Study (see Reference Document No. 5).

This analysis focuses on the urban design issues associated with the Turnaround Project. The overall plans for improvements to this segment of the waterfront include realigned roadways, public and private development projects, the new waterfront park, and other public amenities. The turnaround facility must be one integral element completing and supporting these waterfront improvements. To achieve this objective, four design guidelines were identified in the July, 1987 MUNI Metro Turnaround Embarcadero Urban Design Study. These guidelines include: integrating all functions, enhancing the maritime traditions, promoting visual and physical access to the Bay and balancing the costs and benefits.

INTEGRATING ALL FUNCTIONS

All transportation, land use, and pedestrian functions must be well integrated to ensure an efficient, attractive, and safe design and operations. Train service must be frequent and reliable to ensure patronage. Pedestrians and autos should move easily along and across The Embarcadero; major intersections should facilitate traffic. The landscaping should harmoniously link the area's multiple functions. And the streets, commercial areas, and open spaces should function as a unified area that contributes to the economic vitality of the waterfront.

ENHANCING MARITIME TRADITIONS

Public sentiment and State and Federal laws have stressed the importance of maritime activity along San Francisco's waterfront. The Embarcadero has always been the confluence of maritime/railroad/commercial activity. Transportation systems and land use can enhance the remaining maritime activities and reinforce the maritime traditions of the area. Light rail transit vehicles would return the color and movement of the freight trains that were an important element of The Embarcadero prior to the 1960s. In addition, the historical and maritime traditions could be enhanced by the use of The Embarcadero light standard and bollard and cable barriers.

PROMOTING VISUAL AND PHYSICAL ACCESS TO THE BAY

The San Francisco waterfront has been studied extensively by a wide range of interests - from developers to environmentalists. A major concern to all is preserving and promoting visual and physical access to the Bay. Views can be preserved by carefully aligning streets, trackways, and intersections and by minimizing the height and bulk of building structures. Utilitarian elements and street furniture should be organized to enhance views and access, rather than function as barriers.

BALANCING COSTS AND BENEFITS

A well-designed Embarcadero Parkway, with light rail transit, would foster not only a lively urban environment, but also a healthy one. It would create new opportunities for maritime, commercial, light industrial, and housing developments. In other cities, such as Portland, Oregon, modest public investments in well-designed facilities have induced larger expenditures of private development money. The area within the Turnaround Project study area is already experiencing an expansion of private development land use changes, including Hills Plaza and Rincon Center. Public expenditures to improve The Embarcadero would, therefore, encourage other well-designed developments.

Generally, the most significant element which has an adverse urban design impact on the northern portion of the project area is the Embarcadero Freeway. The freeway overshadows the character and scale of many buildings along the waterfront, including buildings in the East Street Row and the Ferry Building complex. The Embarcadero Freeway also obstructs views and isolates the waterfront from the rest of the City.

Certain design elements of the Turnaround Project could have an urban design impact. The primary elements include barriers, pedestrian control systems, lighting, utility equipment, and the portal and ventilation structures. Potential impacts can be reduced through appropriate mitigation measures which could allow the turnback facility to function more efficiently and safely in conjunction with the Embarcadero Parkway. The mitigations will help ensure that the transportation, land, and pedestrian uses are well integrated and that San Francisco has a lively urban environment along its waterfront.

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction activity would disrupt pedestrian and vehicular access to the waterfront in the project area. Some views would be temporarily blocked by construction equipment and activity. The potential visual impact associated with the presence of construction equipment and activity would perhaps be greatest when lunch time crowds are gathering in Justin Herman Plaza along the Bay Front Promenade.

LONG TERM

Operations: The peak-hour operating plan for the Surface Alternative, described in Section 2.3, Definition of Alternatives, includes turning back six J trains on the center pocket track between Howard and Folsom; 12 K, L and M trains on the middle tracks between Harrison and Bryant; and 12 trains continuing through to the future Metro Extension. This operating plan requires average peak-hour headways of 2 to 2.5 minutes per direction over the pedestrian crossings at Howard, Folsom and Harrison Streets, and a turnback operation on two side tracks between Harrison and Bryant Streets. The headways create conflicts with pedestrians crossing at these intersections.

There is also a potential barrier effect associated with train movements at these frequencies. Train movements in the Embarcadero Parkway median between the waterfront and high density land use developments to the west conflict with development programs and policies which promote increasing physical access to the waterfront.

The frequency of train operations between Bryant and Howard will impact views between the waterfront and intersecting streets to the Embarcadero Roadway as well as adjoining land uses. Temporary location of light rail vehicles in the turnback track areas will block waterfront views during periods of turnback operations (see Figure 4.5-1). Overhead wiring required for the revenue and nonrevenue tracks will be visible from adjoining areas.

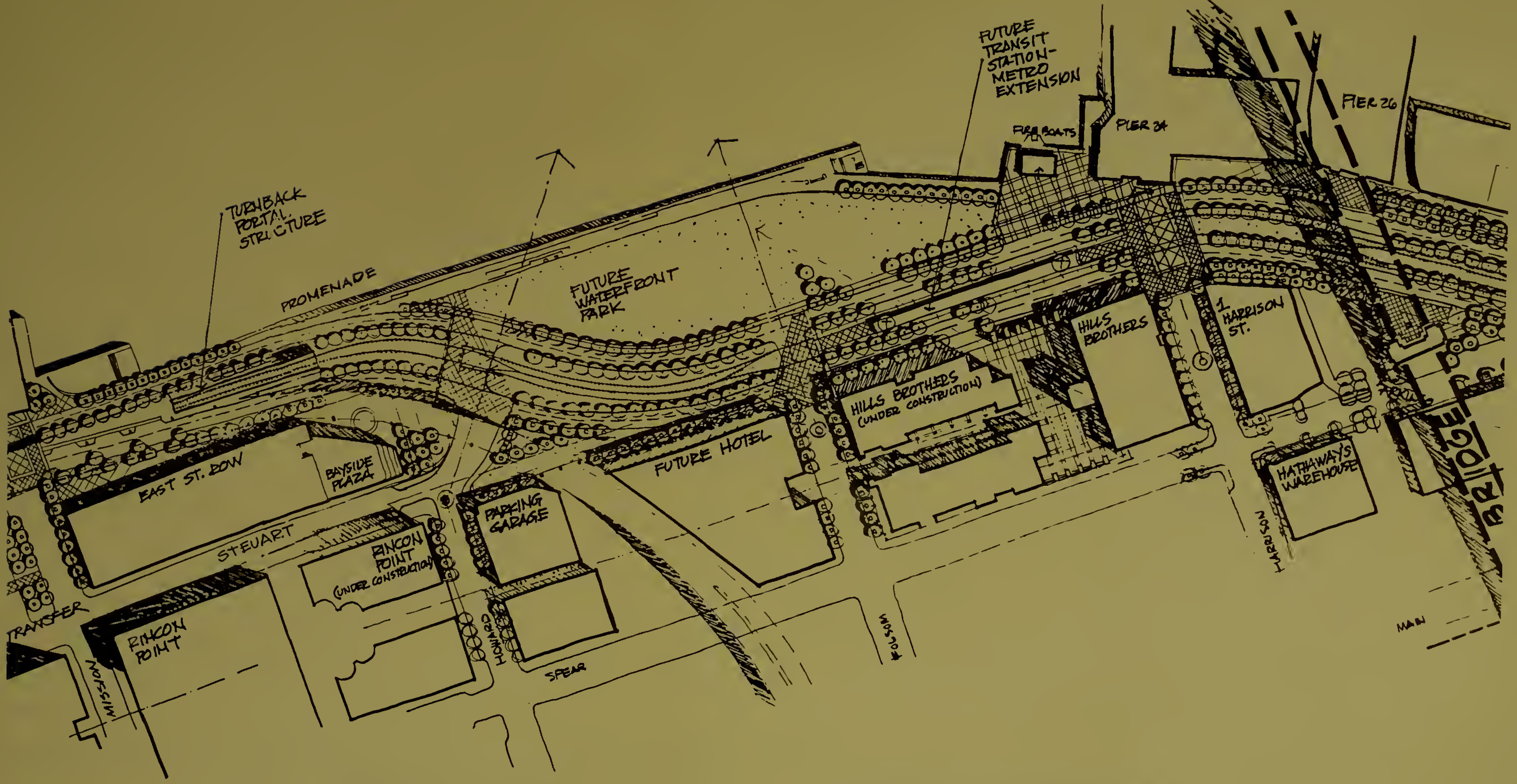
The mainline track and the two turnback tracks require a wider median between Harrison and Bryant Streets (see Figures 4.5-2 and 4.5-3). The median for turnback operations will restrict vehicular access to The Embarcadero from Howard and Harrison to southbound lanes only. From Folsom, access will be to northbound and southbound Embarcadero Roadway lanes. The Surface Alternative would require relocation of the Belt Line Railway into an adjoining traffic lane from Bryant Street to the portal structure near Howard Street.

Additionally, realignment of the Howard and Bryant Streets intersections would be required. The Howard Street intersection will be realigned to allow pedestrians to cross the roadway and track at a distance sufficiently away (approximately 200 feet) from the portal entry and provide a visual link to the waterfront from the Steuart/Howard Street intersection (see Figures 4.5-4 and 4.5-5). The crosswalk directs pedestrians away from track switches located south of the crosswalk (see Figure 4.5-5). Realignment of the Bryant Street intersection would be required because of the additional length needed for the turnback tracks between Harrison and Bryant Streets (see Figure 4.5-6). This intersection, however, was previously planned to be realigned to accommodate vehicular access to Pier 30/32.

Barriers: Pedestrian areas must be separated from those areas used for the turnback operation. The remote-controlled track switches in the pavement which divert trains between tracks are exposed and must be kept away from pedestrian traffic. Different types of barriers to prevent pedestrians from entering track and switch areas were considered, such as four foot chain link fence covered with vines or shrubs. However, these are usually unsightly because of the trash and papers that get blown into them. They also create a visual barrier to the Bay.

Pedestrian Control System: Peak-hour headways require that a system be used to prevent pedestrians from crossing the track in the path of oncoming trains. The pedestrian control system must be effective without adding a visual barrier to the landscape.

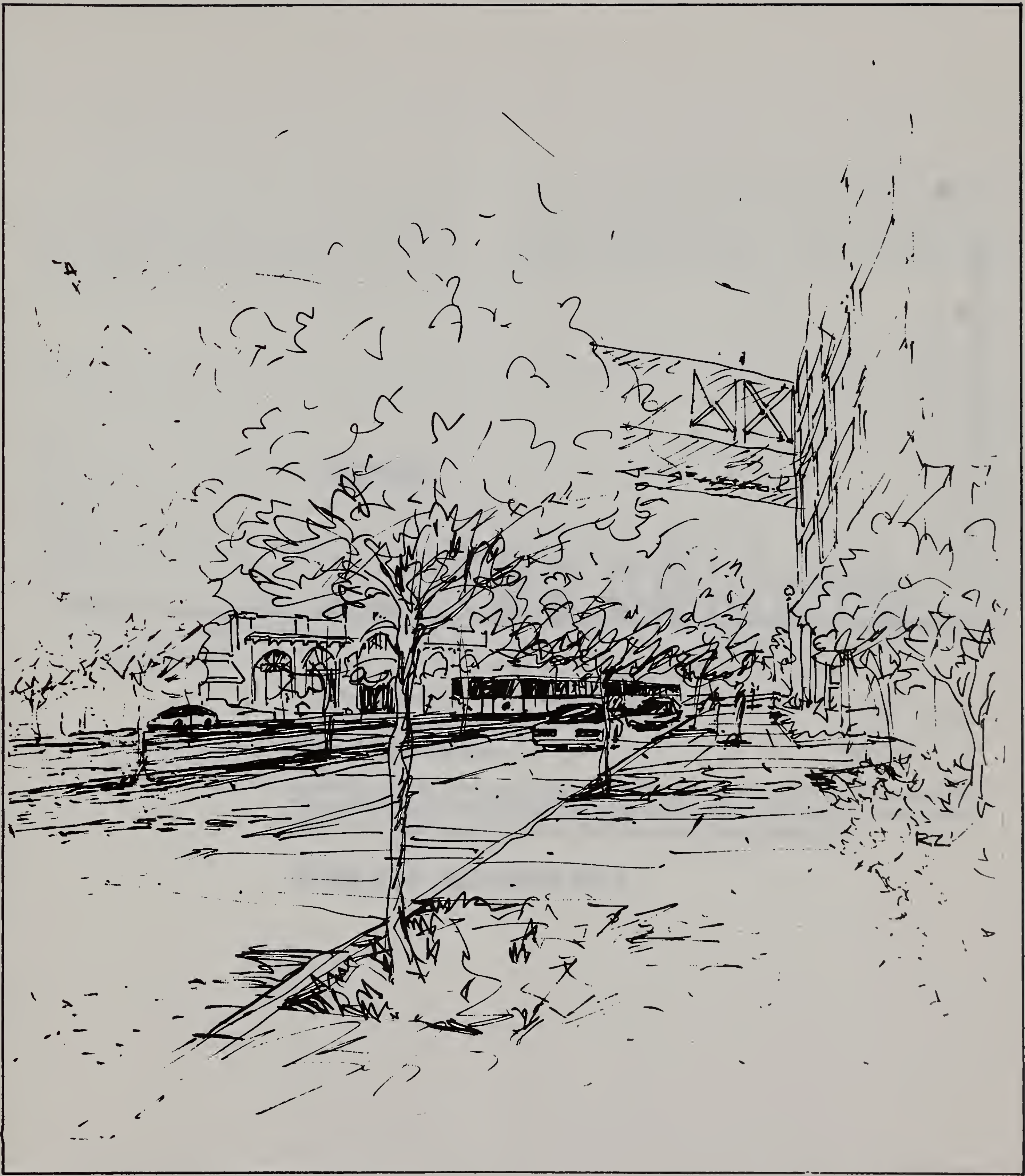
Lighting and Utilitarian Elements: The various poles, signs, signals, and lights needed for pedestrian, train, and auto traffic control can result in clutter and confusion that can be disorienting along this urban waterfront segment.


TURNBACK PORTAL STRUCTURE
PROMENADE
FUTURE WATERFRONT PARK
FUTURE TRANSIT STATION-METRO EXTENSION
FIRE BOATS
PIER 24
PIER 26
HILLS BROTHERS
1 HARRISON ST.
HILLS BROTHERS (UNDER CONSTRUCTION)
FUTURE HOTEL
BAYSIDE PLAZA
EAST ST. ROW
STEUART
RINCON POINT (UNDER CONSTRUCTION)
PARKING GARAGE
TRANSFER
RINCON POINT
MISSION
HOWARD
SPEAR
FOLSOM
HARRISON
HATHAWAYS WAREHOUSE
BRIDGE
MAIN

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround
Urban Design Study 7/87

FIGURE 4.5-1



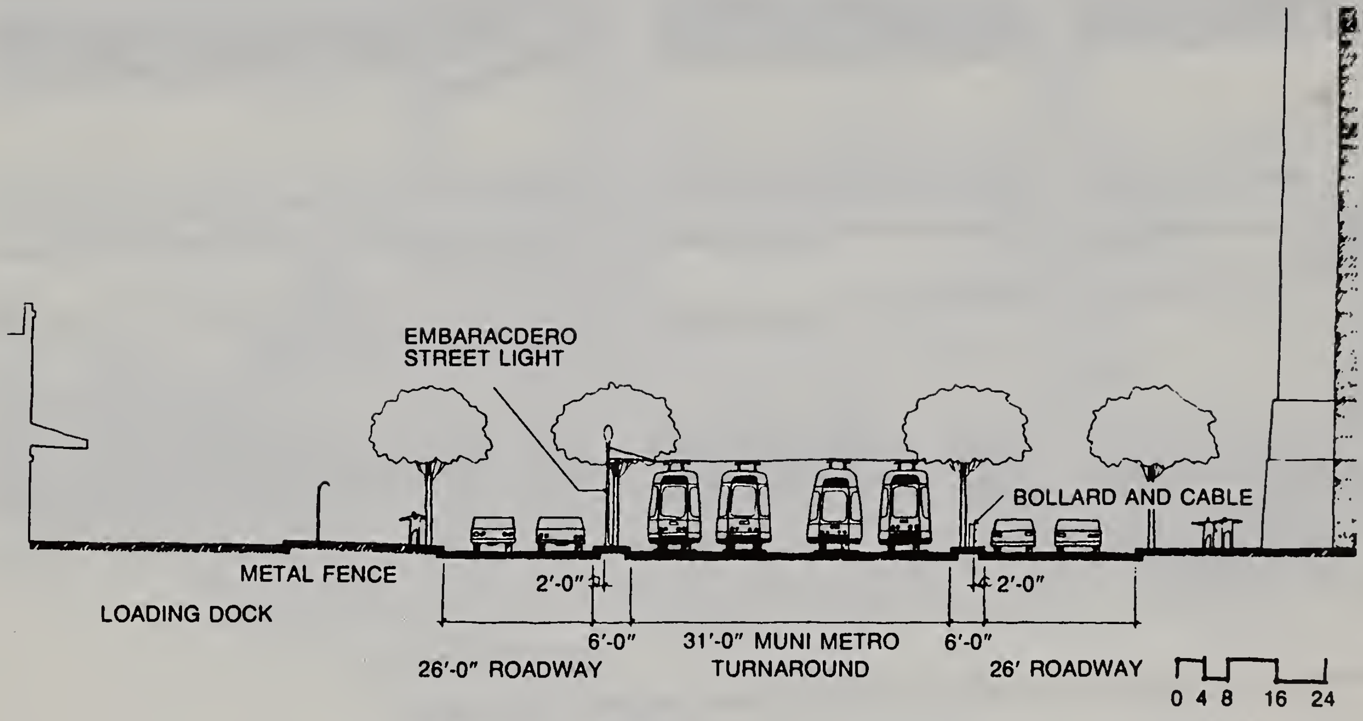
SURFACE ALTERNATIVE

VIEW LOOKING SOUTHEAST FROM HARRISON AND THE EMBARCADERO TOWARDS PIER 28. TURNAROUND TRACK SHOWN IN THE MEDIAN OF THE EMBARCADERO PARKWAY.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-2


EMBARACDERO STREET LIGHT
BOLLARD AND CABLE
METAL FENCE
LOADING DOCK
2'-0"
2'-0"
6'-0"
31'-0" MUNI METRO TURNAROUND
6'-0"
26'-0" ROADWAY
26' ROADWAY
0 4 8 16 24
SCALE 1/8" = 1'-0"

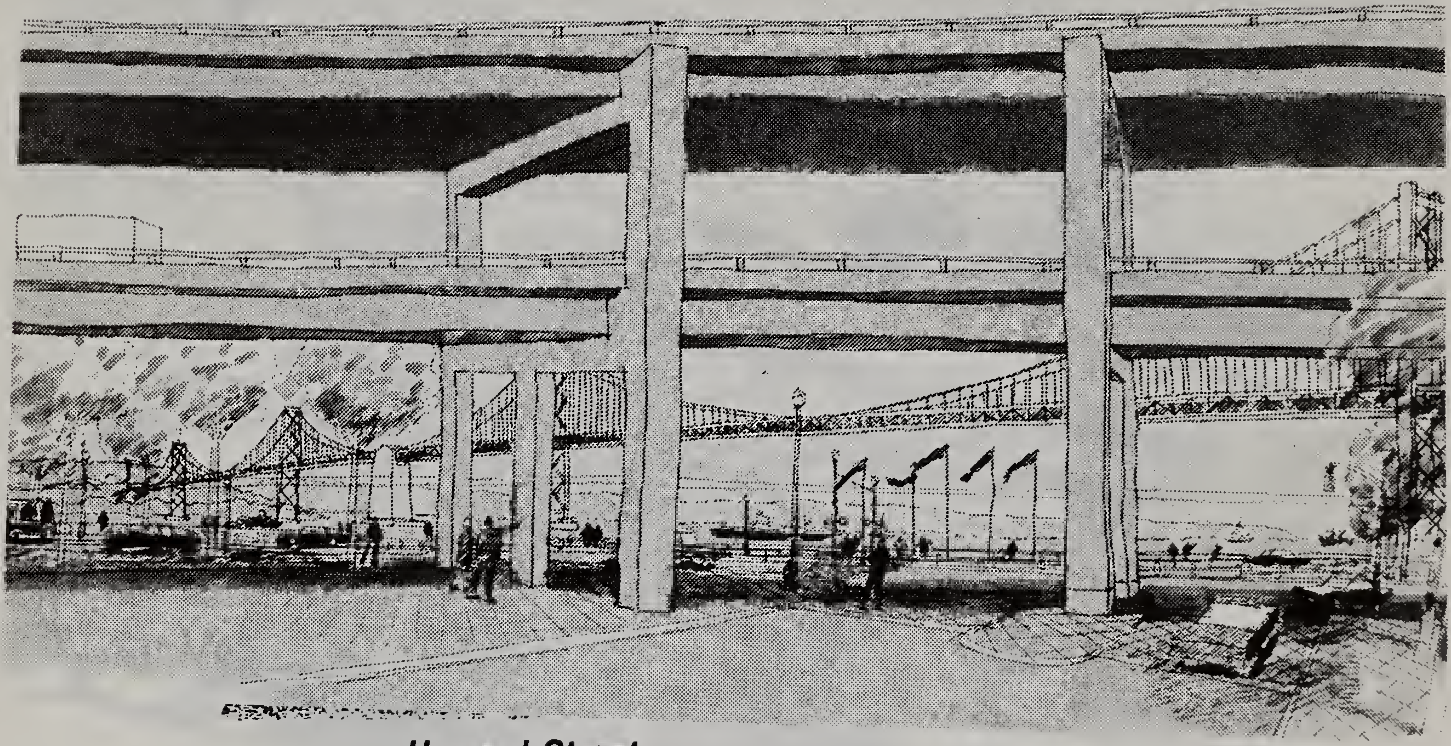
Turnaround Section

These two sections — one at the turnaround near the Bay Bridge pylon and Pier 26, and the other through the train station platform at Hills Plaza — show critical dimensions and relationships as they relate to design elements.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-3



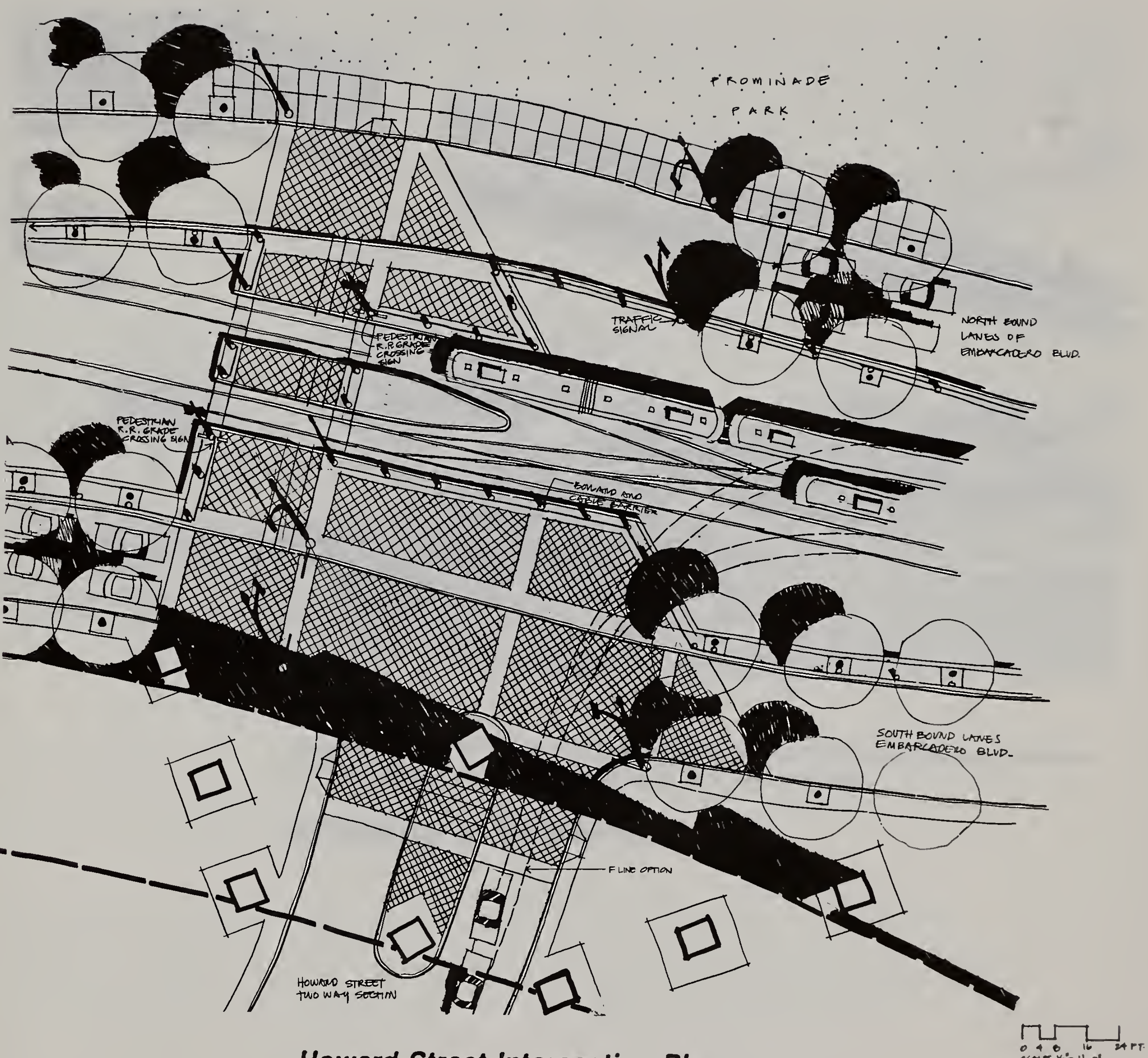
Howard Street

Realignment of Howard Street toward the promenade park beyond The Embarcadero Boulevard.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-4


PROMINADE PARK
TRAFFIC SIGNAL
PEDESTRIAN R.R GRADE CROSSING SIGN
NORTH BOUND LANES OF EMBARCADERO BLVD.
PEDESTRIAN R.R. GRADE CROSSING SIGN
BOLLARD AND CABLE BARRIER
SOUTH BOUND LANES EMBARCADERO BLVD.
F LINE OPTION
HOWARD STREET TWO WAY SECTION
0 4 8 16 24 FT.
SCALE 1/8"=1'-0"

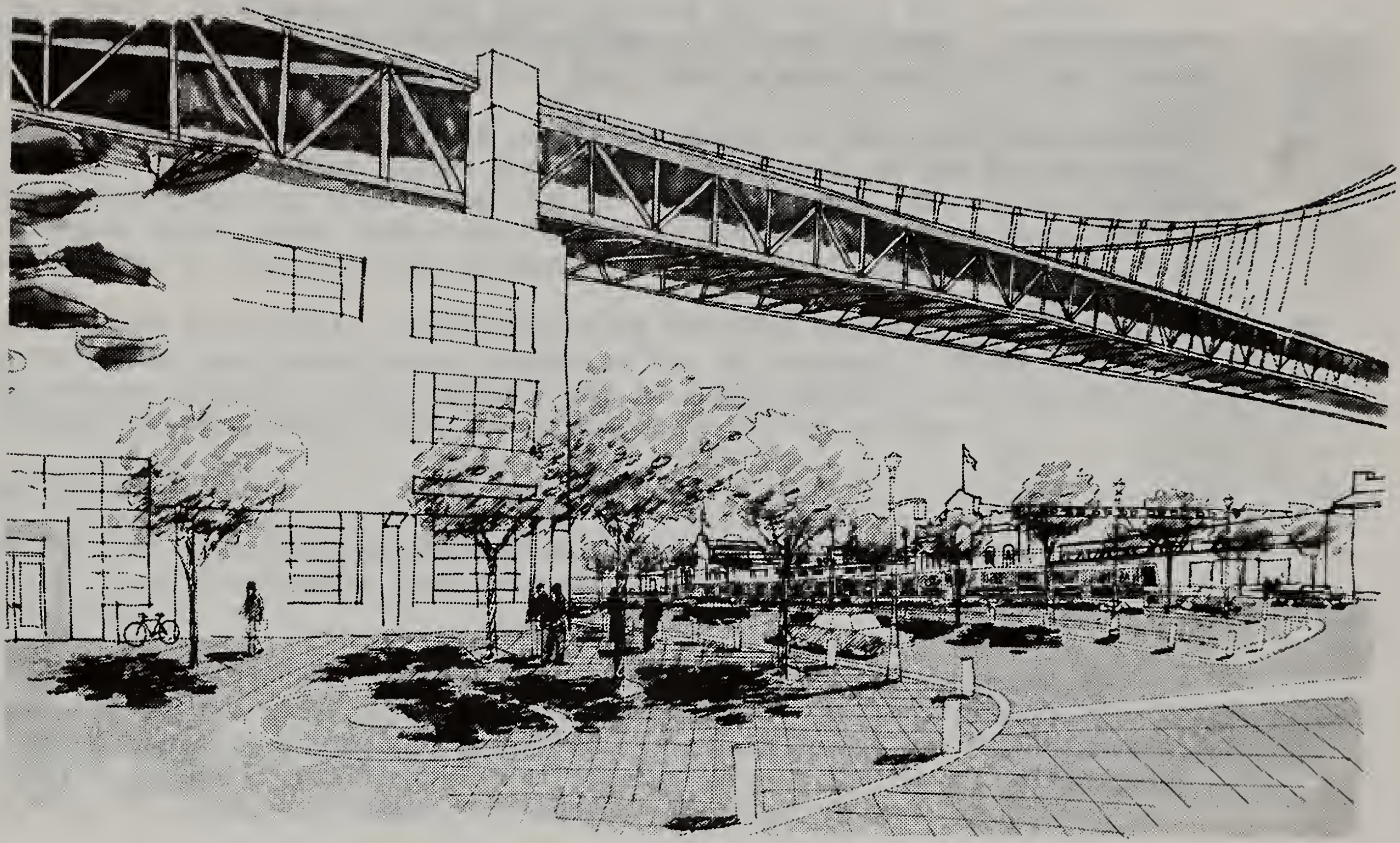
Howard Street Intersection Plan

Enlarged view of Howard Street showing street lighting, bollard and cable barriers, and paving patterns.

SURFACE ALTERNATIVE

SOURCE: **Muni Metro Turnaround Embarcadero Urban Design Study 7/87**

FIGURE 4.5-5



Bryant Street

Standing in Bryant Street, this sketch shows the Muni Metro turnaround facilities at Piers 24 and 26 and the new plaza at 2 Bryant Street.

SURFACE ALTERNATIVE

SOURCE: **Muni Metro Turnaround Embarcadero Urban Design Study 7/87**

FIGURE 4.5-6

Portal: The portal is a long, rectangular opening where the trains come up to grade. It will have parapet walls on three sides; the deepest end will be 18 feet deep. It will be located under the end sections of the elevated Embarcadero Freeway, near the old alignment of Howard Street. Locating the portal here will keep it physically and visually associated with the freeway.

Pedestrian areas nearest to the portal are along the Bayfront Promenade and the sidewalk along East Street Row. The parapet walls of the portal should not block views from East Street Row to the waterfront. The portal, including overhead wires, could contribute further to the adverse impact which the freeway has on the character of East Street Row buildings.

Ventilation Structures: The subway, from the MUNI Embarcadero Station to the portal, must have ventilation structures for air exchange. Their location and appearance adjacent to the southern end of Justin Herman Plaza near the trolley bus turnaround could have a visual impact on the park.

Mitigation

SHORT TERM. There are no mitigation meaures identified for the short-term visual impact associated with the viewing of construction equipment and activity.

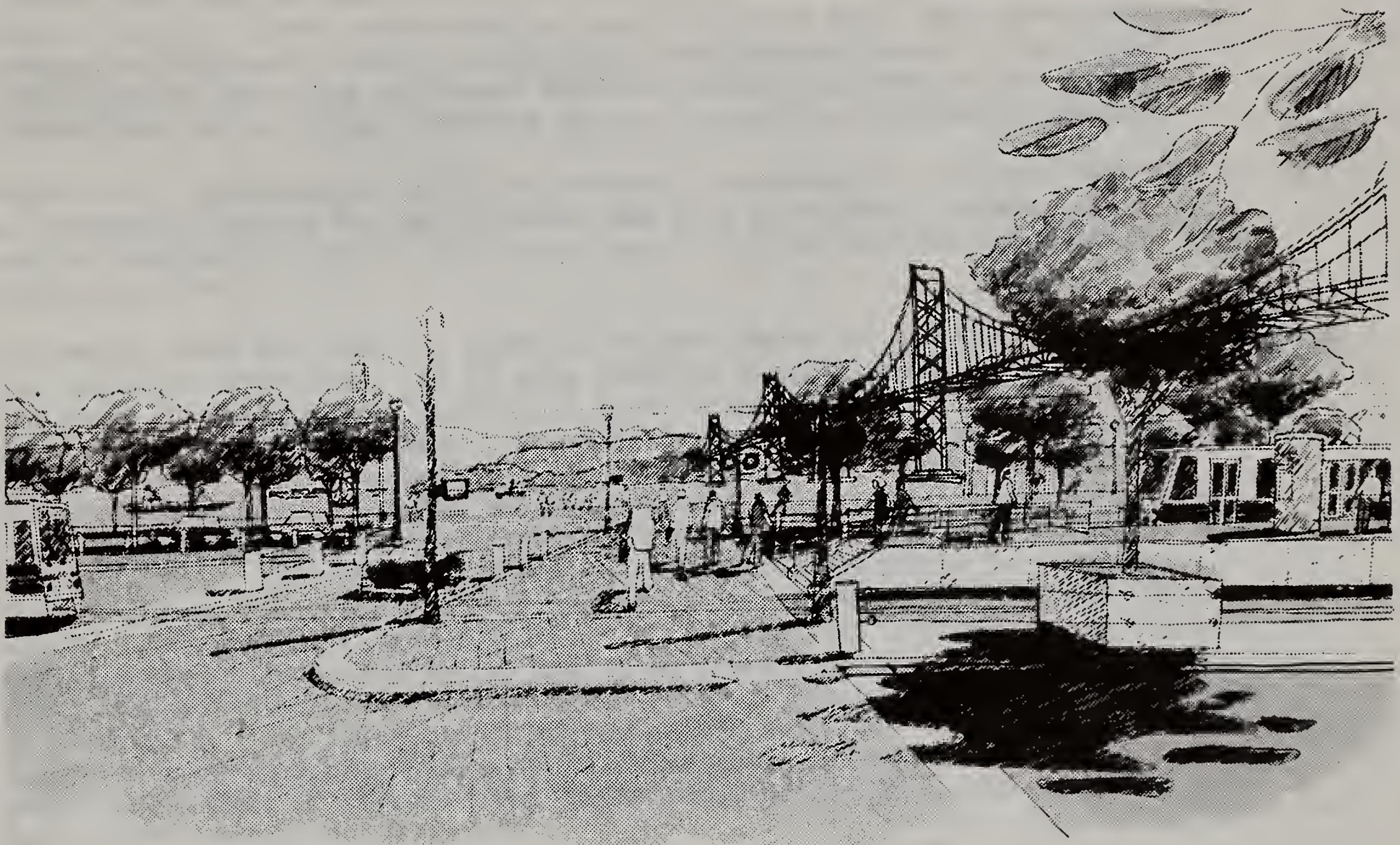
LONG TERM. Operations: Minimize pedestrian conflicts at crossings by changing the Operating Plan, if proven feasible, to include turning back 12 K, L and M trains on the center pocket track between Howard and Folsom Streets; 6 J trains on one of the side tracks between Harrison and Bryant Streets; and utilize the other side track for temporary storage of disabled trains.

This proposed change in the Operating Plan increases the average headway in each direction at the Folsom and Harrison Street crossings to 3.3 minutes during peak periods and five minutes during non-peak periods. These headways reduce the level of pedestrian conflicts and are comparable to two cities nationally (Cleveland, Ohio and Pittsburgh, Pennsylvania) with major transit operations in mixed traffic.

Barriers: Use nautical bollards with cables to separate pedestrians from turnaround operations. Use bollards 3-1/2 to four feet high, with cables attached by means of specially detailed rings. The setup will not block views of the Bay and will maintain the open character of the area. Figure 4.5-6, the Bryant Street sketch, shows how this system could be integrated into the overall design.

Pedestrian Control Systems: Prevent pedestrians from crossing the path of oncoming trains by use of an audio/visual signal which is superior to a gate. Use twin, large black circles with red flashing lights and warning bells. This simple, traditional signal alerts pedestrians to oncoming trains, but does not block views of the Bay. Mount the circles on poles that match the light fixtures along The Embarcadero. (See Figure 4.5-7, Folsom Street sketch.)

Lighting and Utilitarian Elements: Minimize visual clutter and confusion due to a non-coordinated use of poles, signs, signals, and lights. Use the light fixtures now installed along the park promenade as the boulevard light



Folsom Street Intersection Plan

Enlarged view of Folsom Street showing typical design elements and the north end of the train station platform. The Folsom Street Plan is similar to the Bryant Street intersection.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-7

fixture. They can be modified to accept the electrical wire supports for the trains, the traffic control signals, and the pedestrian crosswalk signals (see Figure 4.5-8). Street signs can be incorporated as well, but directional and warning signs should appear on separate, complimentary poles. The Folsom Street sketch shows how all these elements could be integrated to avoid clutter and protect view corridors of the Bay and the bulkhead buildings.

Materials: The bollards should be nautical in character. Precast concrete is an economical choice for the bollards and will give them a substantial quality similar to stone. The cable should also be substantial and could be stainless steel.

The Metro track bed would be paved in typical asphaltic concrete (AC) along the boulevard stretches. AC is more flexible material than concrete, which can crack from the heavy, repetitive train loads and the vibrations. AC can contrast, and therefore demark, non-pedestrian areas, such as track beds and auto pavement. Brick pavers or other high quality and durable materials should be used for pedestrian crosswalk areas. The pavers should be used to guide pedestrians in desired directions away from surface track switches (see Figure 4.5-8). The mid-block crossing at Hills Plaza should be paved to function as an extension of the Plaza paving at the base of the Hills Brothers tower. The area would then join Hills Plaza, Bayfront Promenade, and adjacent maritime structures. The median should be lined with trees. Tree planting along the median would help to screen overhead wires and would provide a sense of continuity along this segment of the waterfront. See MUNI Metro Turnaround Embarcadero Parkway Urban Design Study (Reference Document No. 11) for an overall treatment of street trees in the project area in conjunction with the Embarcadero Parkway improvements.

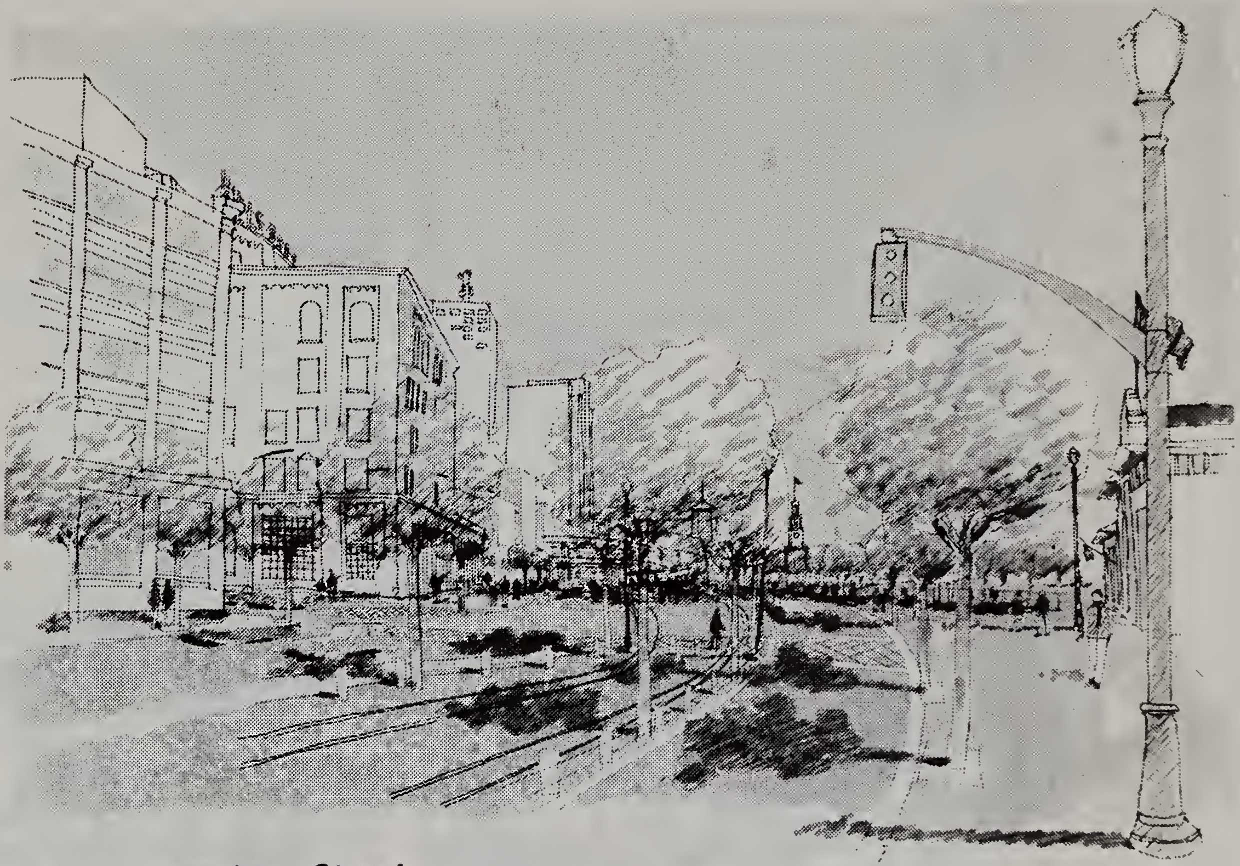
Portal: The portal structure should be plain and simple in overall configuration, similar to the concrete columns and deck of the elevated freeway. Thus, it becomes part of the freeway structure. The walls should be low to minimize the potential for view blockage and enveloped in ivy, similar to the freeway. The fence on the parapet should be a simple decorative steel fence (see Figure 4.5-9).

Ventilation Structures: The location and appearance of the ventilation structures should be carefully considered. When the Embarcadero Roadway is realigned, a new area will open up for design near the bus turnaround and Justin Herman Plaza. The ventilation structures could be located somewhere in this area and used as a sculptural element. Rather than constructing plain, utilitarian ventilation structures, there is an opportunity to design ventilation structures that complement the Plaza.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. These impacts are the same as those identified for Alternative 1 except that the underground construction is longer and more extensive. Therefore, these impacts will occur over a larger area for a longer period of construction.



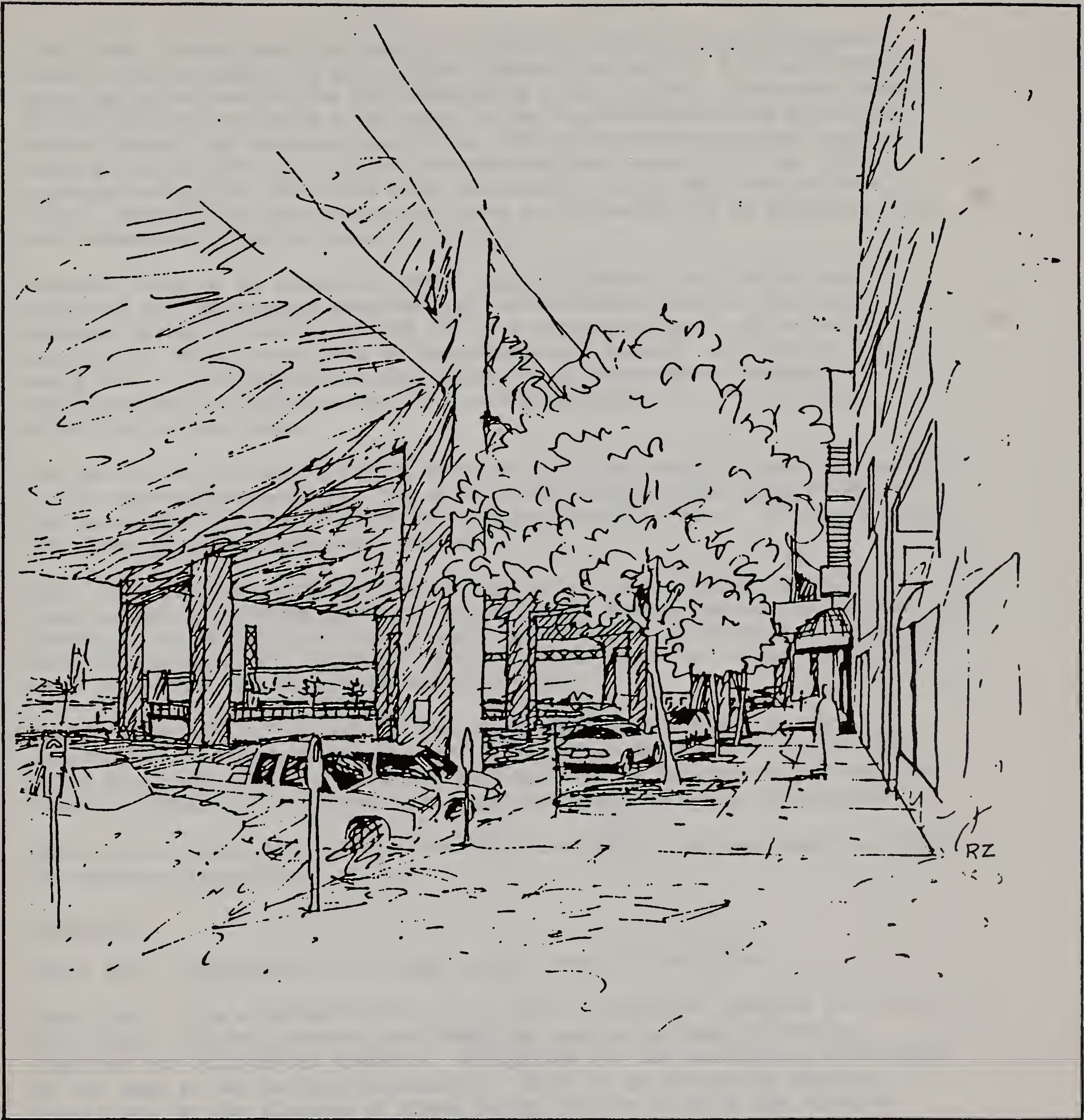
Harrison Street

Standing beyond Pier 24 and the fire station looking north at the Hills Plaza train station with the Ferry Building as a landmark in the background and the Hills Plaza project to the left.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero
Urban Design Study 7/87

FIGURE 4.5-8



SURFACE ALTERNATIVE

VIEW LOOKING SOUTH TOWARDS WATERFRONT FROM EAST STREET ROW. TURNAROUND PORTAL LOCATED BELOW EMBARCADERO FREEWAY.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-9

LONG TERM. Operations: The peak hour operating plan for the Underground Alternative is similar to Alternative 1 except that all J, K, L and M trains would be turned back on the two underground pocket tracks. Temporary storage for disabled trains would be provided on the Surface between the portal and Folsom Street. In the area west of the surface track for disabled trains, views to the waterfront would be blocked when this track is in use. The overhead wiring for this track would be viewed from the area west of this track. Intermittent obstruction of views to the waterfront as associated with the movement of disabled trains would occur.

However, there is no potential future conflict between the limited train operation and development programs and policies which promote increasing physical access to the waterfront and an intensification of office and residential developments west of the Embarcadero Parkway (see Figures 4.5-10 and 4.5-11). The Underground Alternative would accommodate improved pedestrian and vehicular access to future development of Port facilities within the project area.

The median for the Underground Alternative would not restrict vehicular access to the Embarcadero Parkway. This alternative requires less right-of-way for the Embarcadero Parkway between Harrison and Bryant Streets. This would allow for wider sidewalks along this segment.

Since turnback operations are underground, barriers separating pedestrians from turnback operations would not be required. Special pedestrian control systems to avoid conflicts due to train headways and pedestrians at crossings would not be required. Minimal lighting, poles, signs and signal equipment would be needed for the surface disabled track.

Portal: The walls of the portal structure could impact views to the waterfront. The portal area would be visible from the upper floors of the Hills Plaza and future hotel development west of the Embarcadero Parkway, and should be designed to complement the adjacent park and inland development.

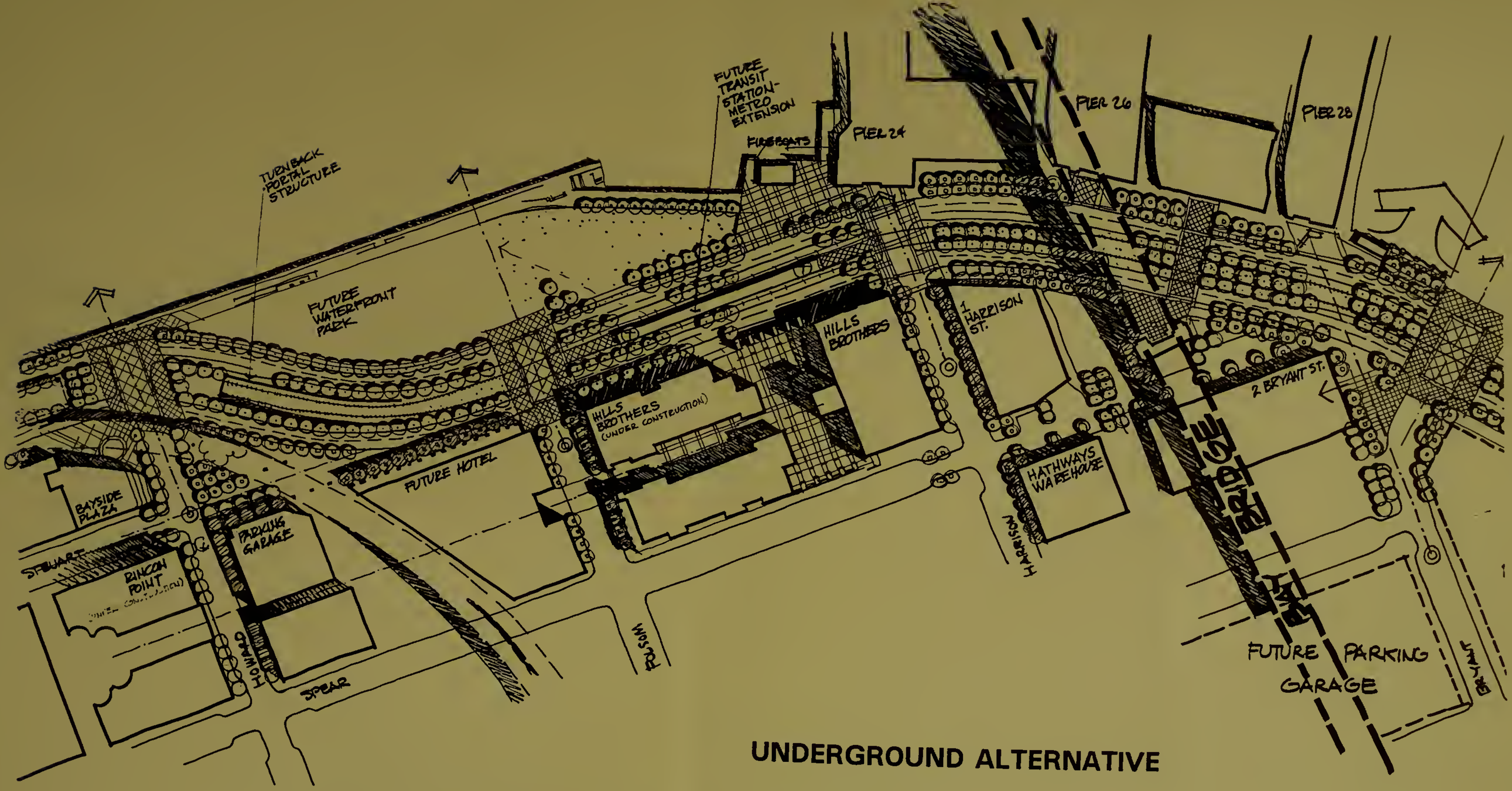
Ventiliation Structures: These structures could have the same impact as under the Surface Alternative.

Mitigation

SHORT TERM. Mitigation is the same as the Surface Alternative.

LONG TERM. This alternative would not require mitigation measures for train operations, related barriers and pedestrian control systems or various lighting and utilitarian elements. Mitigation for the ventilation structures is the same as the Surface Alternative. There is no mitigation measure identified for the blockage of views during periods in which the disabled track is in use.

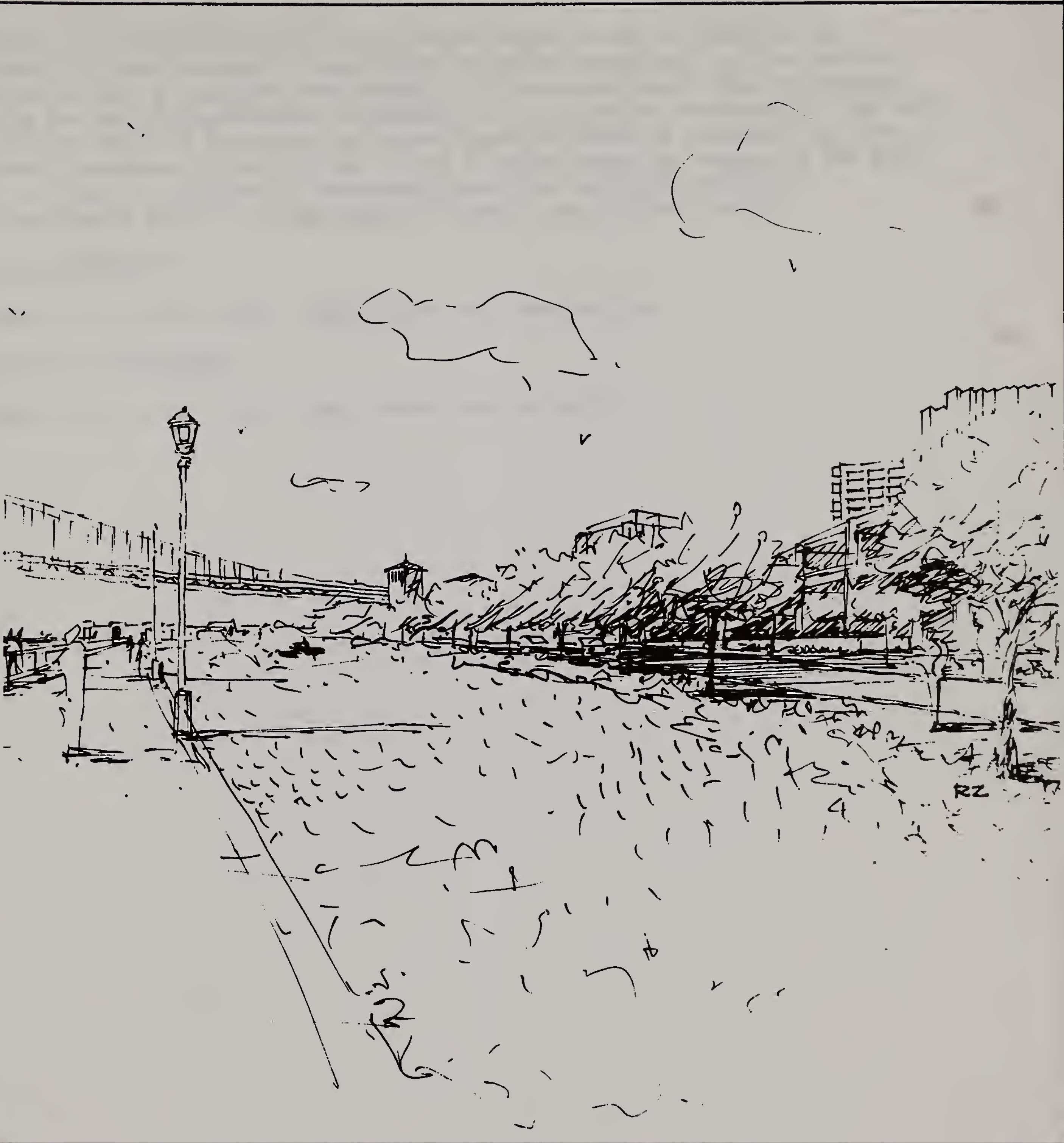
Materials: Materials used for pedestrian crossings, trees lining the median and bollards are as described for Alternative 1.


TURNBACK PORTAL STRUCTURE
FUTURE TRANSIT STATION-METRO EXTENSION
FIREBOATS
PIER 24
PIER 26
PIER 28
FUTURE WATERFRONT PARK
HILLS BROTHERS
HILLS BROTHERS (UNDER CONSTRUCTION)
1 HARRISON ST.
2 BRYANT ST.
FUTURE HOTEL
BAYSIDE PLAZA
PARKING GARAGE
STEUART
RINCON POINT (UNDER CONSTRUCTION)
HOWARD
SPEAR
FOLSOM
HARRISON
HATHWAYS WAREHOUSE
BAY BRIDGE
FUTURE PARKING GARAGE
BRYANT

UNDERGROUND ALTERNATIVE

SOURCE: Embarcadero Parkway
Urban Design Study 8/88

FIGURE 4.5-10



UNDERGROUND ALTERNATIVE

VIEW FROM PROMENADE LOOKING SOUTH AT WATERFRONT PARK. TURNAROUND PORTAL IS WEST OF THE EMBARCADERO PARKWAY WITH HILLS PLAZA TOWER AND BAY BRIDGE IN BACKGROUND.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-11

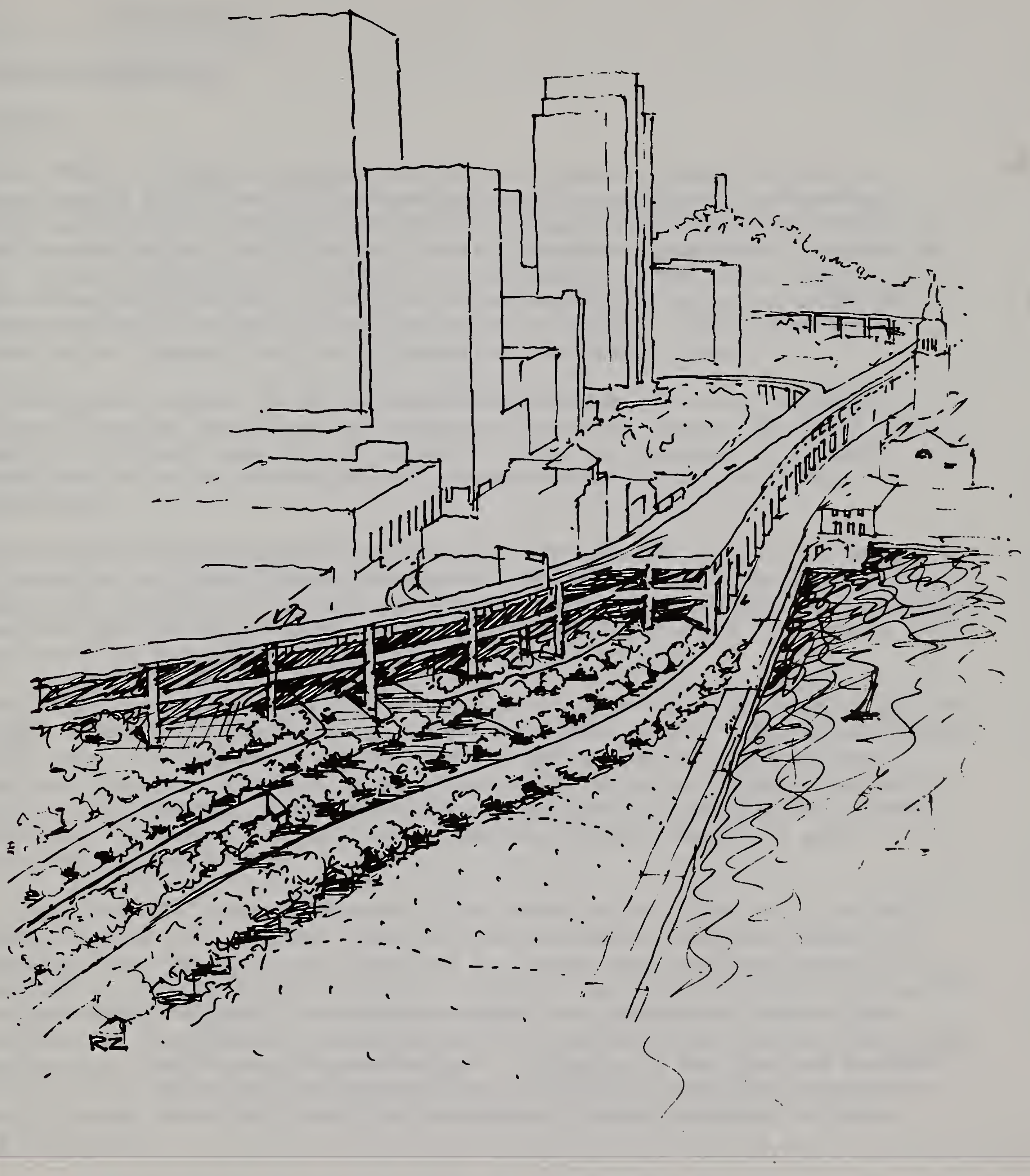
Portal: The parapet walls of the portal should be low to minimize the potential view blockage. Glass block should be considered for the parapet walls to give a sense of transparency. A decorative steel fence consistent with the wall design should be considered. Alternative treatment for the wall includes use of a decorative all-steel fence to minimize potential for the portal structure to block views. Tree planting along the median in the area of the portal would aid in screening views from the upper floors of developments west of the Embarcadero Parkway (see Figure 4.5-12).

TSM ALTERNATIVE

There is no urban design impact under this alternative.

NO BUILD ALTERNATIVE

There is no urban design impact under this alternative.



UNDERGROUND ALTERNATIVE

BIRD'S-EYE VIEW FROM WATERFRONT LOOKING NORTH AT PORTAL AREA. WATERFRONT PARK IN FOREGROUND AND EMBARCADERO FREEWAY AND CITY IN BACKGROUND.

SOURCE:
E. M. Rose and Associates

FIGURE 4.5-12

4.6 AIR QUALITY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The most important temporary air quality impact related to construction activities is increased particulate emissions. Earthmoving, drilling, and soil redistribution activities associated with construction of the transportation facilities would create temporary, localized increases in TSP (total suspended particulates) and particulate matter whose diameter is 10 microns or less (PM 10). As stated in the Existing Setting, no violations have occurred since 1985 in the City of San Francisco. These localized construction impacts could occur throughout the Project Area.

Of particular concern is the proposed drilling that will occur in Justin Herman Plaza and the subsequent excavation under the Plaza. The users of the Bayfront Promenade must also be protected from the increased particulate emissions due to the excavation and transportation of soil along The Embarcadero.

Construction activities also result in pollutant emissions from the operation of gasoline and diesel powered equipment. CO and NOx emissions would be the pollutants of concern from the operation of construction equipment. It is not expected that these emissions would be significant nor would they create local violations of air quality standards for this alternative.

LONG TERM. The operational impacts of this transportation alternative include slight reductions in local air pollutant emissions such as total organic gases (TOG), NOx, particulates, and CO. Transportation related emissions would decrease slightly under this build alternative, owing to projected increased peak period ridership or the MUNI Metro system and the concommitant reduced auto use. The overall effect on regional air quality would be a minor beneficial impact as well.

The proposed MUNI Metro Turnaround is not expected to impact local pollutant concentrations to the extent that the State or Federal standards would be violated, particularly since there are no transit stations with parking lots proposed for the Turnaround Project. However, the Level of Service rating for the Embarcadero/Mission, Embarcadero/Bryant, and Embarcadero/Folsom intersections may be affected by increased traffic projected for the Year 2000 (see Section 4.4, Traffic and Transportation). In spite of the expected decrease in overall CO emissions from automobiles by 1993, the additional Embarcadero traffic could cause very localized increases of carbon monoxide at these intersections.

Mitigation

SHORT TERM. The suggested mitigation measures are limited to construction phases and intended to reduce localized increases in total suspended particulate emissions (BAAQMD, "Dust Control Required Measures" (1983). These supplementary City requirements are listed in the Building Code.

Trucks should be kept off dirt areas and should be kept on paved or graveled roads to the extent possible to minimize road dust. In addition, spray bars should be used at construction area access points to wash wheels and undercarriages of trucks (if permitted by the San Francisco Water Department due to current concerns about drought conditions). If water cannot be sprayed due to drought conditions, dust palliatives should be applied in construction areas to control fugitive dust. Dump truck loads should be covered with canvas or tarps when hauling excavated material of fill to control dust; and paved areas should be vacuum sweeped in a manner that does not entrain excessive dust.

LONG TERM. The decrease in projected emissions of pollutants caused by the implementation of this build alternative results in a beneficial impact that becomes quantitatively insignificant at the county level. Mitigation measures intended to reduce local concentrations of pollutants, therefore, are not required. However, the design of this alternative should be coordinated with the Embarcadero Roadway realignment project in order to prevent localized emission increases during peak periods from queuing automobile traffic due to surface operation of the transit vehicles. Proposed signal priority for MUNI Metro vehicles at the Folsom/Embarcadero intersection should also allow sufficient time for auto movements to reduce vehicular delays.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. As with the Surface Alternative, the most important temporary air quality impact would be increased particulate emissions as a result of construction activity. Although this alternative does not have the large extent of surface track that exists in Alternative 1, this alternative does have a greater amount of underground area in the cut and cover section. Consequently, more material has to be excavated and the resulting particulate emissions could impact the Bayfront Promenade and buildings along The Embarcadero more severely than construction of the Surface Alternative. Other short term air quality impacts are similar to these for Alternative 1.

LONG TERM. No long term impacts will occur. Local air pollutant concentrations potentially generated at The Embarcadero/Folsom intersection in Alternative 1 will not occur in this alternative, since train movements across Folsom Street will be infrequent and the track used only for temporary storage of malfunctioning trains.

Mitigation

SHORT TERM. The suggested mitigation measures, presented under Alternative 1, are intended to reduce localized increases in particulate emissions.

LONG TERM. No long term mitigation measures are required.

TRANSPORTATION SYSTEMS ALTERNATIVE AND NO ACTION ALTERNATIVE

Impacts

SHORT TERM. Since both of these alternatives are no build alternatives, there would be no construction related air quality impacts.

LONG TERM. Although implementation of the no build alternatives would not impact local or regional emissions, they do not produce any beneficial air quality results as in Alternatives 1 and 2, since an opportunity to shift downtown trips from automobiles to transit is not provided.

4.7 NOISE

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction activities would increase noise levels on an intermittent basis along the transportation corridor alignment during the construction period. Typical construction equipment expected to be utilized during the construction of the proposed project and the related radiated noise levels are presented in Table 4.7-1. Sensitive receptors which could be affected by the construction noise without mitigation include the Justin Herman Plaza as well as residential projects at Hills Plaza. Haul trucks and delivery trucks would, on an intermittent basis, cause additional noise impacts along their routes to construction areas. Actual construction and truck traffic noise impacts would vary according to the duration and level of sound generated by specific operations.

LONG TERM. To approximately quantify the sound levels generated by turnback operations, measurements were taken at the J line terminus at Church and 30th Streets and at the West Portal Station at Ulloa Street and Portal Avenue. The measurement distance at both locations was 27 feet from the center line of MUNI Metro right-of-way. The measurements revealed that peak sound levels due to the train passbys were in the range of 76 to 90 dBA, and that sound levels due to operation of the switches were up to 90 dBA.

The American Public Transit Association (APTA) has published sound level guidelines in terms of the peak A-weighted levels. (Note: the A-weighted levels are sound levels as measured using the A-weighting sound level meter. This network is designed to correspond to the frequency response of the human ear.) For high density multi family dwellings and commercial receptors, the guideline level (or goal) identified by APTA is 80 dBA. These levels apply to nighttime operations and to receptors at a distance greater than 50 feet from the tracks. By reference to the measurement data, with adjustment to apply at a 60 foot reference distance, the peak levels from the turnaround operations are predicted to be 84 dBA. This level (for nighttime trains, 10:00 P.M. to 7:00 A.M.) is therefore in excess of the guideline value for "absolute" sound levels. However, note the discussion in the paragraph below regarding the evaluation of impacts in reference to existing ambient levels.

In terms of the increase in sound level over the existing ambient values, the Urban Mass Transportation Administration (UMTA, 1976) considers that increases of up to four dBA in Leq are not significant, provided local and State guidelines are not being exceeded. The San Francisco Noise Ordinance prohibits intruding noise to exceed the ambient noise levels by five dBA.

At most of the noise survey locations, the predicted levels from the train operations will be lower than the measured existing values. Accordingly the resulting total sound level, obtained by decibel addition, will exceed the existing level by less than three dBA. At the survey location at Steuart and Folsom Streets, the project generated increase due to the trains will be four dBA. These results, according to San Francisco Noise Ordinance, do not require mitigation. (Decibel addition is a process of combining sound levels from different sources. This involves adding the total sound energy and taking the logarithm of the result. As an example, the decibel sum of 60 dB and 60 dB is 63 dB.)

TABLE 4.7-1. TYPICAL CONSTRUCTION EQUIPMENT NOISE BEFORE AND AFTER MITIGATION

EQUIPMENT	MITIGATION MEASURE	NOISE LEVEL (dBA) BEFORE	NOISE LEVEL (dBA) AFTER	DISTANCE (FEET)
Pile Driver	Muffler on exhaust and sound barrier the leads	103	95	25
Pavement Breaker	Muffled	105	100	3
Diesel Driven Electric Welder	Muffler plus acoustical enclosure	93	76	23
Air Compressor (Diesel Driven)	Muffled	105	85	3
Air Tracked Drill	Acoustical enclosure	104	83	23
Sinker Drill	Acoustical enclosure	95	78	15
Earth Movers				
Front loader	Muffler	79	75	50
Backhoe	Muffler	85	75	50
Dozer	Muffler	80	75	50
Grader	Muffler	85	75	50
Truck	Muffler	91	75	50
Paver	Muffler	89	80	50
Material Handlers				
Concrete mixer	Muffler	85	75	50
Crane	Muffler	83	75	50
Jack Hammer	Muffler or acoustical enclosure	88	75	50

Source: Urban Mass Transportation Administration, 1974; U.S. EPA, 1971.

Operational Noise from Exhaust Fan. The planned tunnel emergency exhaust fan will produce a predicted sound level of 90 dBA adjacent to the exhaust opening at the south end of Justin Herman Plaza (Frobenius, 1988). The fan is to be operated for one hour per month. The San Francisco City Noise Ordinance does not contain specific absolute limits on the noise from stationary equipment which occur at parks as receptors. However, the ordinance does contain a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by five dBA or more. Since the existing ambient level was measured at 72 dBA Leq, the sound level from the fan could be up to 76 dBA, if operated in the daytime, without being in violation of the numerical limits.

(The Leq has been used herein as representative of the ambient value.) However, it is judged that a nuisance could be created by fan noise levels in excess of 60 dBA. Accordingly, to comply with this provision of the ordinance, it is recommended that attenuation be provided to limit the fan noise levels to 60 dBA or lower. An attenuation of at least 30 dBA is therefore needed.

Mitigation

SHORT TERM. The following mitigation measures will reduce the temporary adverse impacts associated with construction activity:

> All construction related vehicles and equipment will be properly muffled in order to minimize the noise impact of construction.
>
> In addition, construction activities at the project site will be carried out Monday through Friday between the hours of 7 A.M. and 6 P.M. to minimize disturbance to local residents. Also, the public will be informed of proposed construction timelines to minimize potential annoyance related to construction noise. This is important for homes and other receptors located within a few hundred feet of construction activity.
>
> The construction noise impacts affecting the Justin Herman Plaza can be mitigated by the use of six foot or higher solid fencing as a temporary barrier along portions of the south and east boundaries of the park. Potential visual or shadow effects of the fence could be reduced by the use of plexiglas or equivalent material instead of wood. Also, consideration could be given to the use of plantings along the fence or possible decorative murals for aesthetic enhancement.

LONG TERM. To mitigate the sound level impacts which would be created by the tunnel exhaust fan, an appropriate sound attenuator should be provided. The attenuator should provide a sound level reduction of 30 dBA so that the fan sound level would not exceed 60 dBA at the Justin Herman Plaza. A solid structure, such as one made with concrete block, would need to enclose the fan to reduce noise levels this significantly.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Construction noise impacts would be generally similar to those described for the Surface Alternative.

LONG TERM. To quantify the sound levels generated by turnback operations, measurements were taken and evaluated as described in the Surface Alternative. We note that there will be reduced noise with the Underground Alternative, as compared with the Surface Alternative, because the turnback operation is shielded by the tunnel. Also, with the Underground Alternative, noise from switch operation will be reduced because the track switches will be shielded by the tunnel.

The predicted noise level impacts which will be created by the planned tunnel exhaust fan are as described for the Surface Alternative.

Mitigation

The recommended mitigation measures for construction noise, train noise and fan noise will be as described elsewhere for the Surface Alternative.

TSM ALTERNATIVE

With this alternative there would be no change in the operations that would affect the noise generated. Therefore, there would be no acoustical impact in reference to the existing ambient sound levels.

NO PROJECT ALTERNATIVE

With the alternative there would be no change in the operations and therefore no acoustical impact in reference to the existing ambient sound levels.

4.8 ENERGY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Initial impacts on energy would involve energy consumed for construction of the build alternatives. Table 4.8-1 presents the total construction energy consumed, in barrels of oil equivalent, for this alternative. The majority of the energy consumed involves cut and cover, tunneling, and U-wall construction. The major cuts and tunneling require substantial fuel for excavating, loading, transporting, and off loading of excavated material.

LONG TERM. Operations energy requirements involve energy for vehicle propulsion. Table 4.8-1, which summarizes the operations energy requirements by alternative, shows a very slight increase (1.7 percent) in energy required for operating the Surface Alternative over the existing requirement. This increase is due to the additional total route miles traveled by Metro vehicles in the Turnaround facility. The calculation does not reflect the expected throughput increase of the vehicles in the Market Street subway which would be manifest as an increase in energy consumed per vehicle mile traveled due to increased average vehicle speed.

Since the Turnaround Project and other City facilities use renewable hydroelectric power from the Hetch Hetchy Water and Power system, the operations energy requirement of this build alternative should not impact nonrenewable energy resources.

Mitigation

SHORT TERM. Local sources of gravel, track bed and other fill material should be used consistent with supply and cost constraints to minimize haul trip lengths.

LONG TERM. Since the operations energy requirement for the Surface Alternative is not substantially greater than the existing operations energy consumption, no mitigation measures intended to reduce operations energy consumption are required.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The total construction energy for the Underground Alternative is presented in Table 4.8-1. Although this alternative has less total length of track than the Surface Alternative, it has a greater portion of its alignment underground. Consequently, because of the additional excavation, this alternative will consume the greatest amount of nonrenewable energy in the construction process.

LONG TERM. The operations energy requirement for the Underground Alternative is indicated in Table 4.8-1. This alternative has a slightly lower operations energy requirement than the Surface Alternative due to the shorter length of the Turnaround facility.

TABLE 4.8-1. TOTAL CONSTRUCTION ENERGY CONSUMED

ALTERNATIVE	TOTAL CONSTRUCTION ENERGY (B.O.E.) (a)	DAILY OPERATIONS ENERGY REQUIREMENTS (B.O.E. per day) (b)
No Action	-	124.6
Transportation Systems Management	-	124.6
Underground	24,086	126.2
Surface	19,293	126.7

(a) Barrels of Oil Equivalents

(b) Vehicle Propulsion Energy Only

Source: Earth Metrics Incorporated, 1988.

Mitigation

Same as for Alternative 1.

TSM AND NO-ACTION ALTERNATIVES

Impacts

SHORT TERM. Since both of these alternatives are no-build alternatives, no nonrenewable energy resources related to construction activities would be consumed.

4.9 CONSTRUCTION METHODS

Since construction impacts only apply to the build alternatives, Alternatives 3 and 4, the Transportation System Management and No-Action Alternatives, are not discussed in this section.

4.9.1 CUT AND COVER SLURRY WALL CONSTRUCTION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. A typical cross section of the proposed slurry wall construction is shown in Figure 4.9-1. The three foot thick slurry walls are installed first. These walls extend down 30 feet below the base of excavation and are supported on deep piles. During excavation the walls are heavily braced to resist lateral movements due to the load of the adjacent soil. The first level of bracing support is the temporary deck which maintains street traffic during construction. After construction of the permanent concrete box structure, the area is backfilled and the surface restored.

Excavation for the below grade portions of the Turnaround Project will involve removal of soil and groundwater that will require off-site disposal of approximately 43,000 cubic yards of soil. Possible impacts include lowering of the groundwater table in the vicinity of the excavation with resulting settlements of nearby streets and structures. The construction will also result in vertical and lateral movements of the soils in the base of the excavation and adjacent to the excavations.

Excavation and construction of the new MUNI subway structure will interfere with some of the deep pile foundations of the existing elevated Embarcadero Freeway and interfere with traffic on The Embarcadero.

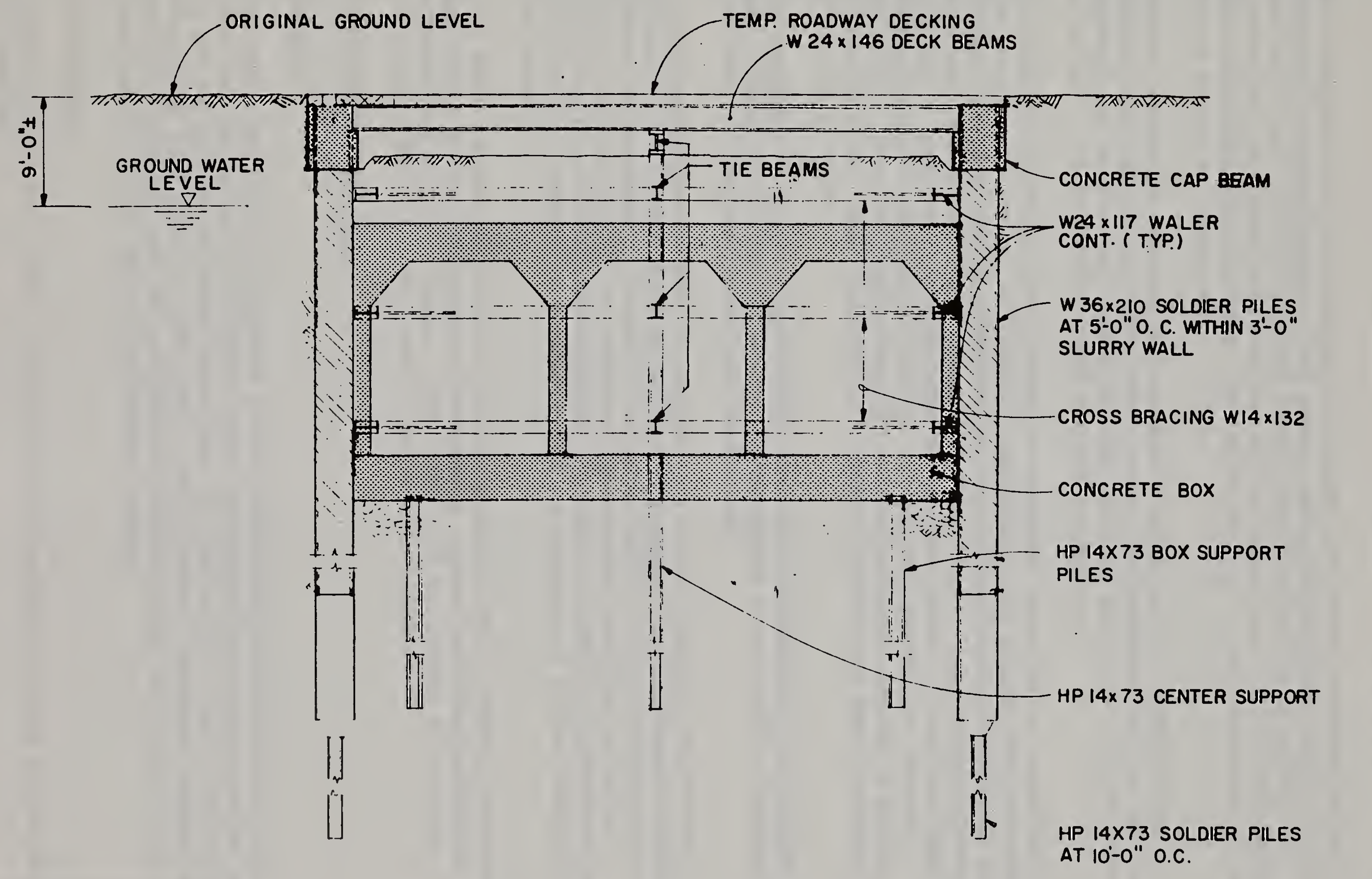
Excavation and pile driving, which will occur within the limited headroom under the elevated Embarcadero Freeway, will be required through the old rock sea wall.

The buildings most likely to be impacted by the construction are those between Mission and Howard Streets facing The Embarcadero and possibly the State of California Department of Agriculture Building south of the Ferry Building and east of The Embarcadero. Because the distance to these buildings exceeds 60 feet (about twice the maximum depth of excavation), cut and cover construction is not expected to have an adverse impact on these buildings.

LONG TERM. The construction of the Surface Alternative is not expected to have any significant, construction related, long term adverse impacts except for possible differential settlements of streets adjacent to the MUNI facilities. The only operational impact is that vibration of MUNI trains could be transmitted through the soil to adjacent buildings.

Mitigation

SHORT TERM. Soldier Pile Tremie Concrete Slurry Walls (slurry walls) will be installed prior to the main excavation to prevent drawdown of the groundwater outside of the excavation, and to minimize the vertical heave at the base of


ORIGINAL GROUND LEVEL
TEMP. ROADWAY DECKING
W 24 x 146 DECK BEAMS
9'-0"±
GROUND WATER LEVEL
TIE BEAMS
CONCRETE CAP BEAM
W24 x 117 WALER CONT. (TYP.)
W 36x210 SOLDIER PILES AT 5'-0" O. C. WITHIN 3'-0" SLURRY WALL
CROSS BRACING W14 x 132
CONCRETE BOX
HP 14X73 BOX SUPPORT PILES
HP 14x73 CENTER SUPPORT
HP 14X73 SOLDIER PILES AT 10'-0" O.C.

earth metrics

FIGURE 4.9-1 CUT AND COVER CONSTRUCTION STAGE THREE

the excavation and the resultant settlement and lateral movement of soil adjacent to the excavation. The slurry walls would be very stiff (36 inches wide with steel piles every five feet), deep (30 feet below bottom of excavation), and heavily braced at ten foot intervals. Slurry wall methods were used extensively on BART, and the technology is well developed in the United States and overseas.

Special excavation methods and equipment, including the possible use of special low headroom equipment developed by the Japanese, will be utilized to excavate the slurry wall trench through the rock sea wall. Solider piles will be installed in predrilled holes through the sea wall.

The MUNI structure has been located to minimize the effect of construction on the Embarcadero Freeway and adjacent buildings. To support the Embarcadero Freeway structure during construction, bent column pick-up structures are employed. The pick-up structure can be described as prefabricated steel stanchions installed directly under the support points of the Embarcadero Freeway girders and properly tied to the concrete column for lateral stability. They are then mounted on a steel grillage, through a series of hydraulic jacks, thus transferring vertical loads to the newly installed underpinning piles.

The uppermost tier of cross-bracings also serve as beams for the support of a heavy timber deck to be constructed where ground level traffic interrupted by the construction work needs to be maintained.

An instrumentation program to monitor surface settlements, groundwater, stresses, and strains will be employed throughout the construction operation. Limits and contingency plans will be established prior to construction to define conditions when the construction should be modified or halted. Additionally, a restoration program for repair of surface improvements and minor external damage to buildings will be implemented by the construction contractor.

LONG TERM. Normal maintenance (street repaving) should readily accommodate any impact of the differential settlements between subsiding ground and the non-settling MUNI structures. MUNI rails will be mounted on resilient rail fasteners similar to those used in the existing subway.

UNDERGROUND ALTERNATIVE

Impacts

The short and long term impacts of the Underground Alternative are similar to those of the Surface Alternative except the magnitude of construction impacts is greater due to the wider excavation (31 feet to 49.5 feet), the longer excavation (543 feet to 1,058 feet), the increase in disposal volume (43,000 cy to 101,000 cy), and the proximity of old buildings on the west side of The Embarcadero between Mission and Howard Streets.

Mitigations

SHORT TERM AND LONG TERM. Mitigations are the same as those of the Surface Alternative.

4.9.2 TUNNEL CONSTRUCTION

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The existing BART tunnels will be affected by the construction of MUNI tunnels right above their alignment. To understand the impact of the MUNI tunnels on the existing BART tunnels, MUNI tunnel construction is described below.

MUNI tunnel construction will be carried out above the BART tunnels at a distance ranging from four feet at the Spear Street Ventilation Shaft to a distance of 11 feet at TR Station 530, about 450 feet east of the shaft. Even with careful execution of the construction work it has to be anticipated that the balance of forces that exist presently in the soil around the BART tunnels will be altered by the proximity of MUNI tunnel construction, and that readjustments of stresses and strains will occur in the BART tunnel linings. Our analysis indicates that these stresses and strains will not impair the structural capacity of the BART tunnel linings. However, they will contribute to increased leakage through the bolted joints of the tunnel linings.

Where timber piles, cut off during MUNI tunneling, bear against the lining of the BART tunnels, it has been anticipated that pile stubs can exert additional load against the BART linings as the tunnel shield passes over the pile stubs.

The MUNI tunnels will be driven from an access shaft constructed in the future MUNI ventilation structure at the southeast corner of Justin Herman Plaza, westward toward Market Street and the Spear Street Ventilation Shaft. Temporary facilities for removal of excavated material and supply of tunnel lining material will be located in the access shaft. The tunnels will be driven downgrade. During most of the tunnel driving, the tunnels encounter mixed face conditions with fill material in the upper part of the tunnel face and recent Bay Mud in the lower part. After about 300 feet of tunnel driving, the MUNI tunnels will cross above the BART tunnels on Market Street. From here the MUNI tunnels continue above the BART tunnels until they arrive at the Spear Street Ventilation Shaft.

The most significant impact on the BART tunnels will occur at the flexible joint between the BART tunnels and the Spear Street ventilation shaft. Additionally, the drainage water from the new MUNI tunnels will flow into the Spear Street Ventilation Shaft. The Spear Street Ventilation Shaft will require modification to permit the breakthrough of the MUNI tunnels into the shaft. Walls must be strengthened to allow construction of an effective seal between tunnel and shaft. Settlement of the surface improvements and utilities will occur above the MUNI tunnels.

Driving the MUNI tunnels around the short radius curve (R = 300 feet) at Market and Steuart Streets may cause compression and flow of the Recent Bay Mud on each side of the tunnel.

Buildings adjacent to the future MUNI tunnels on Market Street are the Hyatt Regency Hotel on the north side, the Southern Pacific building and the Federal Reserve building on the south side. Both the Hyatt Regency and the Federal

Reserve building have been constructed in the 1970s, after the BART tunnels were driven. The Southern Pacific building at 1 Market Street was in place while the BART tunnels were driven. The 11 story brick building is supported on piles penetrating into the sand layers below the Bay Mud. The building was monitored during BART tunnel driving by settlement points located at the top of column bases at street level. These column bases settled only .01 foot during the BART tunnel driving. Even better performance can be expected for the MUNI tunnel driving. Because the MUNI tunnels are driven closer to the street surface, the settlement trough created by the MUNI tunnels is only expected to be half as wide as that created by the lower BART tunnels and, therefore, will have a lesser effect on the building.

The Hyatt Regency Hotel and the Federal Reserve building are also supported on piles extending the building loads to the firm layers of sand below the Bay Mud. Settlements of similar magnitude as those incurred by the Southern Pacific building can be expected and no structural damage should be anticipated. Some settlement of sidewalks and curbs on Market Street should be expected, particularly the sidewalk vault at 1 Market Plaza. Utilities in Market Street over the future tunnels are likely to sustain crack damage due to settlement.

Compressed air used in tunnel driving is likely to escape through street gutters, building basements and utility manholes. Based on experience during BART tunnel driving, the air escapes at a low pressure. No damage is normally associated with this occurrence.

The surface of Justin Herman Plaza will also be impacted during tunnel driving to the extent that surface improvements will settle up to six inches and grouting from the surface will be required prior to tunneling.

LONG TERM. Experience indicated that problems associated with the remolding of the soil around the BART tunnels during MUNI tunnel driving can continue to affect the BART tunnels over a longer term and could result in increased leakage over the "long term" until the remolded soil is readjusted to existing pressures. Similarly, long term settlement of one to two inches may occur over the MUNI tunnels.

Mitigation

SHORT TERM. To assure that stress changes caused by MUNI construction can be accommodated in the tunnel lining, all components of the lining, including the high strength bolts connecting the lining segments, must have adequate structural capacity. During recent visual inspection of the BART lining, corrosion damage of the bolts was noticed. To determine the extent of this damage, further inspection and testing is required. However, to assure the full design capacity of the BART tunnel lining, it is anticipated that part or all the bolts in the first 450 feet of both BART tunnels east of the Spear Street Ventilation Shaft will have to be exchanged. It is also anticipated that lead caulking in the caulking grooves of the linings will have to be performed to stop increased leakage resulting from the MUNI tunnel construction.

Remedial work will also be required at the BART tunnel seal at the Spear Street Ventilation Shaft. This work may include replacement of parts of the seal assembly and grout injection behind the seal to stop water inflow. Grout injection outside of the lining through existing grout plugs may also be considered in the areas of the tunnel to stop persistent leaks. Additional pumps will be installed at the Spear Street Shaft.

The most critical design considerations are development of methods for locating, cutting and removing existing piles with sufficient care to assure minimum disturbance of the BART tunnels and control of the tunneling at the fill clay boundary. A Tunnel Construction Monitoring Program will be designed and implemented to monitor construction performance. Soil deformation and settlement, tunnel lining strain, and tunnel lining joint opening will be monitored and compared to allowable values established by analysis and experience. Reference survey monuments and benchmarks will be established underground and on the surface to monitor surface and tunnel subsidence and diameter deformation. At the outset of MUNI tunneling, before the tunnels reach the BART tunnels, a Test Section Monitoring Program will be implemented which will confirm the predicted and specified tunneling performance before tunneling reaches the critical area over the BART tunnels.

Contingency construction modifications will be developed ahead of construction to deal with unacceptable deformation of BART tunnels or connecting bolt breakage. Loss of compressed air, inflow of water, loss of ground at the tunnel face, difficulties in pile removal, power or utility failure will also be addressed.

A remedial repair program will be implemented by the construction contractor to repair minor damage to surface improvements, utilities, and buildings effected by the tunneling.

LONG TERM. Minor remedial work may be required to correct long term surface settlement and leakage in BART tunnels.

4.9.3 U-WALL CONSTRUCTION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. U-wall construction is a special type of open cut used where the alignment is ascending to the surface, between the subway portal and the surface. The concrete structure is open to the sky and shaped to the letter U with a base slab to support the tracks and retaining walls on each side to support the adjacent fill.

The shallow depth of the U-wall (4 to 24 feet) allows the use of interlocking sheet piles to temporarily retain the adjacent fill during the construction. Pile driving and excavation will impact the existing Embarcadero elevated freeway column foundations.

The impacts of U-wall construction include drawing down the existing ground water due to leakage at the interlocking joints.

LONG TERM. The long term impacts are similar to the cut and cover slurry wall construction.

Mitigations

SHORT TERM. Sheet piles will be installed in preexcavated trenches through the rubble fill and rock sea wall. Trench walls will be supported by a bentonite slurry. The sheet piles are driven 20 feet below the base of the excavation to prevent seepage.

The MUNI structure is located to minimize the impact on existing Embarcadero elevated freeway column pile foundation.

LONG TERM. The long term mitigations are similar to the cut and cover slurry wall construction.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM AND LONG TERM. The short and long term impacts are similar in detail and magnitude to the Surface Alternative except that the location between Howard and Folsom Streets avoids any excavations in the rock sea wall and the portal structure is clear of the Embarcadero elevated freeway.

Mitigation

SHORT TERM AND LONG TERM. Mitigation measures described in the Surface Alternative are applicable for this alternative.

4.9.4 SEISMICITY/LIQUEFACTION POTENTIAL

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The effects of earthquakes on underground and above ground structures are due to ground vibratory motion and fault displacement. The vibratory motion of the bedrock is transmitted to the ground surface primarily by shear waves through the soil. These waves may cause granular soils to liquify, may deform the ground surface, and may cause structures to move and/or vibrate. The major structures of the Surface Alternative subject to this movement and/or vibration include tunnels, cut and cover box structure, U-wall structure, and the Embarcadero Freeway. Since the MUNI Metro Turnaround Project is not located on any known active fault line, the effects of faulting will not be considered.

The potential short term impacts of earthquakes on these structures, and of the construction operations, include the collapse of excavation faces, the liquefaction of the granular fill material, differential surface settlement, damage to partially completed structures, and interruption to utility services.

LONG TERM. The potential long term impacts due to earthquakes on the completed MUNI structures and facilities include damage to the underground and elevated structures and differential surface settlements that would distort the surface trackage and overhead contact wire system.

Mitigations

SHORT TERM. All construction work will be done in accordance with current building code requirements. Critical construction operations such as major excavation, bracing, and concrete pouring will be done in phases to limit the amount of partially completed work exposed to earthquake damage. Tunnel face support will be required to minimize damage to the excavation face. Back up power will be provided for all critical operations such as tunneling under compressed air.

Fill material at the crown of the tunnel will be grouted prior to tunneling to stabilize the soil and to prevent liquefaction. Grouting or densification of loose sandy fills below the U-wall sections can stabilize these soils and limit vibration induced settlements to tolerable amounts.

Flexible type surface track work will be used, and adjustable rail fasteners will be installed in the subway structures to facilitate realignment of track.

LONG TERM. All new MUNI underground structures will be designed in accordance with the current state of the art of seismic design. All underpinning of the Embarcadero Freeway will be done in accordance with current CALTRANS seismic requirements. As demonstrated in 1906 by the satisfactory behavior of pile supported structures in areas of severe liquefaction, the MUNI Turnaround facilities, supported on pile foundations, are not expected to be adversely affected by liquefaction effects, provided that the loss of support in the liquefied zones is taken into account in the design of the structures.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM AND LONG TERM. The short and long term impacts are similar to those of the Surface Alternative except the magnitude of the potential impacts is greater for the cut and cover structure due to the wider excavation (31 feet to 49.5 feet) and the longer length (543 feet to 1,058 feet).

Mitigation

SHORT TERM AND LONG TERM. Same as in Alternative 1.

4.9.5 UTILITY RELOCATION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The most significant impacts to utilities resulting from construction operations are to the water, telephone, electric power, and sewer facilities.

The high pressure water system in Market Street ruptured subsequent to the original BART construction due to subsidence. There is currently a 14 inch high-pressure waterline in Market Street above the bored tunnel area that may be endangered if subsidence occurs. A 12 inch high pressure waterline crosses the cut and cover area transversely along Mission Street and will need relocation. Other transverse waterline crossings, occurring along the at-grade section of Folsom Street, at Harrison Street, and at Spear Street, will be affected by construction.

Major telephone duct banks and underground vaults lie in the path of the cut and cover construction area at Mission Street and at Howard near the end of the u-wall section. Damage to the underground vaults could disrupt telecommunication services. Another crossing that could be damaged during construction occurs at the at-grade section at Folsom Street.

Electric power duct banks that cross the cut and cover area north of Market Street and another diagonal crossing of the at-grade section at Howard Street will also be affected by construction. All sewer crossings or encroachments occur within the at-grade portions of the Turnaround Project and could be damaged during construction of the rail bed.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The high pressure water line in Market Street may require relocation to an area outside the tunnel envelope to avoid subsidence. The 12 inch high pressure water line in Mission Street crosses an area where the tracks will be relatively deep. This facility, as well as waterline crossings of surface track construction, can be supported in place.

A primary concern with telephone facilities is maintenance of services. Both major communication lines to the financial area and transcontinental lines are located in the project area. The diagonal crossing north of Market Street occurs at a point where the tracks are relatively deep. It would be desirable to support the duct banks in place with extreme care taken to avoid damage. This would require working closely with Pacific Bell and exploring the possibility of performing the work with their staff. The crossing at Howard Street is critical. It occurs at a location where the tracks are approaching the surface. It appears that there will be physical conflict with one of the underground vaults and possibly with the duct banks. Since service maintenance is crucial, the vaults may need to be lowered. Protecting the duct banks should be explored with Pacific Bell, requiring careful potholing of the facilities to verify their depth.

The electric duct banks are parallel and closely aligned to the telephone facilities. The crossing south of Market Street should be handled in a manner similar to that of the telephone facilities. The crossing at Howard Street occurs where the tracks are at-grade; it should be possible to support the electrical facilities in place.

All utility relocation or strengthening in the surface section from Howard to Bryant Streets will be included in the Embarcadero Parkway Project. Sewer crossings transversing the surface alignment should be supported in place. The consolidated sewer beneath the Steuart Street tracks should be evaluated to assure that it is structurally capable of handling added loads. Any appurtenances that conflict with the tracks or do not offer required clearances should be reconstructed.

LONG TERM. None anticipated.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The impacts to the telecommunications, electrical, water, and sewer facilities are those mentioned for the Surface Alternative. However, because the portal is located south of Howard Street, impacts related to the telecommunication facilities located under The Embarcadero at Howard are likely to be less significant.

The 36 inch sewer force main and 7 foot 6 inch sewer cross the cut and cover area in Howard Street and appear to encroach into the tunnel area by about one foot. As a result, cut and cover construction could damage the sewer line.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The same mitigation measures apply in this alternative as in the Surface Alternative. Additionally, the depth of the MUNI box should be lowered by one foot to avoid conflict with the sewer line at Howard Street.

LONG TERM. None anticipated.

4.10 WATER RESOURCES

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction of the Surface Alternative is expected to temporarily alter surface drainage characteristics along the cut and cover and U-wall sections of the alignment. Excavation activities involving disruption of pavement and deposition of soils and other debris would divert surface water runoff to alternate storm drain inlets. Storm drains in the project area should be adequate to accommodate disrupted surface drainage. Impacts on surface water runoff from the Surface Alternative are expected to be temporary and, therefore, negligible.

Water quality impacts associated with construction of the Surface Alternative would include the introduction of sediment from excavation and demolition activities into the storm/sewer system. Entry of sediment into the storm/sewer system would have minimal water quality impacts because the City has a "closed" sewer system: sediment is usually deposited in the sewer pipe, carried as bed load or suspended load, and collected in the siltation basin at the treatment plant. As a result, additional maintenance work to clean storm drains and siltation basins could be required during construction. The amount of additional maintenance would depend on the extent and effectiveness of erosion control techniques used to minimize the introduction of sediment and other materials into the storm/sewer system.

Excavation for below grade portions of the Surface Alternative will involve dewatering, or the extraction of groundwater. Possible impacts include lowering of the groundwater table in the vicinity of the excavation with resulting settlements of nearby streets and structures. According to the current project design of the Surface Alternative, it is assumed no dewatering in the fill, behind the cut and cover and U-wall sections of the alignment, or deep dewatering below the excavation, will be allowed. These assumptions regarding groundwater control are intended to avoid the settlements commonly associated with groundwater lowering.

Excavation and construction of the tunnel below Market Street and Justin Herman Plaza will involve localized dewatering, mainly at the access shaft just to the east of Justin Herman Plaza. Dewatering would occur within 100 feet on either side of the access shaft (Frobenius, 1988), but would not be necessary along the tunnel alignment. During tunneling operations, high pressure air will be continually introduced into the tunnel, thereby preventing groundwater from seeping into the tunnel from the sides. Ground subsidence may be expected near the access shaft due to dewatering; however, this subsidence is expected to be localized and minimal (Frobenius, 1988). The subsidence may affect nearby underground utilities, streets, and sidewalks. Minor cracks may occur in streets and sidewalks as subsidence and settlement occurs. Increased stresses may be placed on utility lines and connections. Underground utilities should be designed with sufficient flexibility to withstand ground movement associated with minor subsidence and settlement.

Construction of the project would involve either on-site or off-site disposal of groundwater associated with dewatering. Disposal of groundwater would depend primarily on the presence of contaminants in the groundwater. The extracted groundwater meeting minimum acceptable quality standards can be disposed of in the storm sewer system.

Construction of the proposed project would not impact floodplains or wetland areas as neither occurs in the project vicinity. Similarly, dredge and fill activities are not utilized.

LONG TERM. Construction and operation of the Surface Alternative would not adversely impact surface water runoff. Construction of the project would require modification of local drainage with possible improvements to the storm drainage system. Therefore, the proposed project may have beneficial long term impacts on surface water drainage.

Operation of the surface alignment is not expected to significantly impact surface water quality. The proposed MUNI Turnaround Project is not expected to introduce any new pollutants that are not already present in the drainage system.

Mitigation

SHORT TERM. The following measures are recommended to reduce the surface water runoff/water quality impacts from construction of the Surface Alternative.

Appropriate erosion control devices should be utilized to retain sediment within the project area during the construction period. In addition, excavation operations should be evaluated and inspected periodically by a qualified soils engineer to determine effectiveness of erosion control techniques. Also, additional maintenance work to clean storm drains and siltation basins may be required during construction.

The following measures are recommended to reduce groundwater impacts from construction of the Surface Alternative.

Partial mitigation of settlement impacts would involve the implementation of slurry walls and no dewatering of areas behind the walls or below the excavation. The measures are proposed in the project construction design. In addition, careful monitoring of groundwater conditions and soil movements should be implemented during construction, and modifications of construction procedures be made, if required, to limit movements to tolerable amounts. Such measures may include groundwater recharge, if feasible.

Extracted groundwater with contaminant levels below minimum allowable standards should be allowed to set in sedimentation tanks prior to disposal into the storm/sewer system. Also, extracted groundwater with contaminant levels in excess of minimum allowable standards should be disposed of off-site in an appropriate manner.

LONG TERM. The Surface Alternative is not expected to have significant long term impacts; therefore, no mitigation is required other than patching of structural cracks induced by differential settlement.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Impacts associated with construction of the Underground Alternative would be similar to the Surface Alternative. However, because the Underground Alternative requires a greater amount of excavation and surface disruption, impacts on surface water runoff would be slightly greater than the Surface Alternative. Although a slightly greater amount of surface water runoff would be diverted to alternative storm drains during construction, the impacts on drainage are expected to be temporary and, therefore, negligible.

Water quality impacts associated with construction of the Underground Alternative would be similar but slightly greater than impacts associated with the Surface Alternative. The greater amount of excavation required with the Underground Alternative would have a greater potential for sedimentation and, therefore, a greater impact on water quality. A greater potential for siltation of storm drains would exist. However, impacts on the storm/sewer system from construction of the Underground Alternative could be mitigated through effective erosion control techniques.

Construction of the Underground Alternative will require a greater amount of groundwater extraction due to the greater area extent of excavation required. Dewatering under this alternative may cause settlement over a larger surface area than the Surface Alternative. Settlement over a greater area may cause greater damage to underground utilities, sidewalks, and streets. Construction of the Underground Alternative also has a greater potential to impact nearby buildings due to greater excavation, groundwater withdrawal and potential settlement.

Groundwater impacts associated with the tunneling portion of the alignment in the Underground Alternative would be similar to the impacts associated with the Surface Alternative.

Additionally, construction of the Underground Alternative would not impact floodplains or wetland areas as neither occurs in the project vicinity.

LONG TERM. Same as Alternative 1.

Mitigation

SHORT TERM. The mitigation measures recommended to reduce the hydrologic impacts of the Surface Alternative can be applied to the Underground Alternative. Although mitigation measures would be similar, the Underground Alternative may require more extensive implementation of these measures. The reparation of damaged buildings, utilities, sidewalks, and streets due to settlement may be greater and may require greater funding than the Surface Alternative.

LONG TERM. The Underground Alternative is not expected to have significant long term impacts; therefore, no mitigation is required.

4.11 BIOLOGY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The proposed alternatives are within a developed area and are expected to have a minimal impact on biological systems. The project will eliminate no natural, pristine habitats and no endangered or threatened species are expected to be disturbed.

Construction of the Turnaround Project will not entail the removal of any street trees; however, the Embarcadero Roadway realignment will require removal of three London plane trees at the eastern corner of the Howard and Steuart Streets intersection. The impact of removal of this vegetation would be insignificant as it provides only minimal value to wildlife.

Silt and dust generation could have a significant localized impact during construction if allowed to coat leaf surfaces. Additionally, construction activities could impact vegetation not scheduled for removal by damaging roots or branches which extend into the construction area.

Grouting will take place within the Justin Herman Plaza in order to stabilize the soil for construction of the tunnel. This process is not expected to have a significant impact provided that the grouting material is chemically stable. If a cement grout is used, there would be a possibility of lye leaching into the soil and harming plant roots. However, in consultation with the City of San Francisco Recreation and Park Department's Urban Forester, it was learned that the Justin Herman Plaza's tree and plant roots are primarily located within a depth of four feet. Therefore, if grouting is to take place beneath the ten foot depth level, as is proposed, grouting should cause no problem to landscaped trees and plants in the Plaza (Cooney, 1988).

There is a possibility of ground subsidence of up to six inches within the Justin Herman Plaza due to construction. If this subsidence is slow and uniform over the area of the Plaza as expected, then there should be no significant impact.

LONG TERM. No long term impacts are expected to biological resources.

Mitigation

SHORT TERM. Any trees removed during the construction process should be replaced with trees of suitable type, size, and density. Replacement trees should have low maintenance requirements and should be visually aesthetic and should be types specified by the City of San Francisco Parks and Recreation Department. In addition, standard construction practices to minimize dust and silt generation and their runoff into the bay (e.g., watering of construction sites and use of temporary catch basins) should be employed.

Temporary fencing should be placed around trees during grading and construction activities to prevent inadvertent damage. Construction within the dripline of mature trees should be avoided to the maximum extent feasible. Also, grouting material chosen should be chemically stable to avoid any possible harm to existing vegetation in Justin Herman Plaza.

LONG TERM. None required.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The short term impacts will be the same as the Surface Alternative.

LONG TERM. No long term impacts are expected to biological resources.

Mitigation. The same mitigation measures are recommended for the Underground Alternative as has been recommended for the Surface Alternative.

4.12 HAZARDOUS MATERIALS

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Since historical research and agency consultation have revealed the possibility of hazardous waste contamination along the proposed alignments, it is anticipated that a soil sampling and testing program will be required for compliance with the Maher Ordinance and to also determine if any excavated or exposed soil will constitute a hazardous waste. Soils sampling occurs as part of Final Engineering for the project. The Director of Public Works (DPW) initially reviews the site history and proposed testing program. The Department of Public Health (DPH) also reviews the proposed testing program. Both of these entities may recommend further testing and/or areas of testing based upon their knowledge. If soil sampling is required by the DPW and/or the DPH, the soil sampling and testing program would include borings in the areas of the proposed excavations, at locations of suspected contamination, and at locations where no contamination is suspected.

The following soil tests are required by the Maher Ordinance:

1. for inorganic persistent and bioaccumulative toxic substances as listed in Section 66699(D) of Title 22 and the California Administrative Code;

2. for volatile organic pollutants as listed in 40 Code of Federal Regulations, Part 122, Appendix D, Table II;

3. for PCBs;

4. for pH levels;

5. for flammability;

6. for cyanides;

7. for sulfides;

8. for methane and other flammable gases;

9. for those hazardous wastes designated by the Director pursuant to Section 1008;

10. for any other hazardous waste that either the Director of Public Health or the certified laboratory, after an examination of the site history has reason to conclude may be present on the site. The Director of Public Health shall make any such determination with 30 days of filing by the applicant of the site history.

(a) Soil sampling shall be conducted in accordance with procedures for sampling soils approved by the California Department of Health Services or the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board.

(b) Samples shall be analyzed by a DHS certified laboratory in accordance with methods for analyzing samples approved by the California Department of Health Services of the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board.

The analysis of groundwater is not subject to the Maher Ordinance. However, consideration should be given to the installation of groundwater monitoring wells; particularly as required by the Regional Water Quality Control Board, where the State's waters have been affected by contamination, e.g., the discharge of fuels from a leaking underground fuel tank where the total petroleum hydrocarbons in soil exceed 100 ppm and/or free product is observed on top of the water.

LONG TERM. None anticipated.

Mitigation Measures

SHORT TERM. Due to the varied nature of hazardous materials, many mitigation options are available. In the case of fuel contaminated soils, the process of aeration and/or biodegradation will substantially lower the fuel concentrations. Where fuels exceed 100 ppm and/or floating product has been observed on top of the groundwater, groundwater monitoring wells are necesssary first to delineate the contaminant plume in the groundwater and then to begin a remedial action program that extracts and treats the contaminated groundwater so as to reduce concentrations. In the case of solvents, any detectable concentration requires the same action.

The heavier petroleum hydrocarbons such as oil and grease are difficult to biodegrade but can sometimes be recycled or excavated and off hauled to a Class II or Class III disposal dump site.

In the case of heavy metals in soil, removal and transport to a Class I dump site is sometimes required. The State will not allow disposal in Class I dump sites after May 8, 1990. There are alternative technologies that can fixate metals in soils.

LONG TERM. None anticipated.

4.13 HISTORICAL AND CULTURAL RESOURCES (SECTION 106 COMPLIANCE)

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The Area of Potential Environmental Impact (APEI) for the project is within an area characterized as archaeologically sensitive. There is a good possibility that the tunneling and cut-and-cover construction activity could uncover recorded or unrecorded cultural resources. The known location of the sunken gold rush ship Roma is approximately at the point where tunneling would begin under Justin Herman Plaza. The sunken storeship Callao is also believed to be near the area of proposed tunneling activity. Since Alternative 1 involves less excavation than the underground alternative, the relative potential of discovering unrecorded prehistoric or historic cultural resources is less with Alternative 1.

Vehicular access to the historic buildings along East Street Row will be impeded during construction. Other impacts include dust, noise, and dirt associated with construction activity. Alternative 1 is not expected to otherwise impact the East Street Row buildings.

LONG TERM. Cut-and-cover and tunneling construction activity will impact portions of the Old Seawall. Previous surveys have not identified the Old Seawall as eligible for the National Register. A Request for Determination of Eligiblity will be prepared.

Portions of the Belt Line Railway within the project area may have to be relocated to enable construction of the Turnaround Project in conjunction with the Embarcadero Parkway. The existing tracks below the Embarcadero Freeway would be affected by construction for the Turnaround portal structure and the transition of the alignment from surface to below grade. The tracks between Folsom and Bryant are affected by Alternative 1 as well as Embarcadero Parkway realignment.

Although the presence of the Embarcadero Freeway has a primary impact on East Street Row and the relationship of these historic buildings to the waterfront, the location of the portal structure of Alternative 1 contributes to a change in the character of the existing environment below the freeway and east of the YMCA, the Embarcadero Inn and the Hinh/Meyer Buildings.

Mitigation

SHORT TERM. A qualified archaeologist will be retained to prepare a construction monitoring program and monitor excavation work. The archaeological monitoring program will be coordinated with the State Historic Preservation Office (SHPO). Construction contracts will include "time buffers" to minimize potential impact on the construction schedule. Below grade, support walls of the Turnaround structure will be kept at least 75 feet from the East Street Row buildings.

LONG TERM. A Request for Determination of Eligibility from the State Historic Preservation Office will be prepared since construction will affect portions of the Old Seawall.

The Department of Public Works requested a Determination of Eligibility for the Belt Line Railway in conjunction with the Embarcadero Parkway project in April of 1988. In May of 1988 CALTRANS informed the Department of Public Works that SHPO has already concurred with the determination of Eligibility for the Belt Line recommended by CALTRANS in conjunction with the I-280 EIR. Pending is a request by the Department of Public Works for a joint Belt Line clearance for the related transportation improvement projects (Turnaround, Embarcadero Parkway, Historic "F" Line Street Cars). A joint mitigation program is most desirable for related Belt Line impacts.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Alternative 2 requires more cut-and-cover construction and therefore has a greater potential for encountering possible buried cultural resources.

Support walls of the Turnaround structure below grade will be kept at least 30 feet from the Audiffred Building which would be the closest point of the alignment to East Street Row. Since the cut-and-cover excavation is closer to the East Street Row buildings, architectural features and building facades may incur cracking due to settlement associated with construction of the underground alignment.

LONG TERM. Portions of the Belt Line Railway may require relocation into an adjoining traffic lane. The Old Sea Wall is impacted by Alternative 2. The portal structure of Alternative 2 is located south of Howard Street and therefore does not have an effect on the East Street Row properties.

Mitigation

SHORT TERM. Construction methods will be utilized which maintain ground stability during excavation. Construction procedures will be monitored for building settlements during construction. Construction procedures will be modified, if required, to limit movements to acceptable amounts. Any cracking induced by construction will be patched as required. Funding will be provided for work identified.

LONG TERM. The long-term mitigation measures for Alternative 2 are the same as those for Alternative 1.

TSM ALTERNATIVE

This alternative does not have any impact on historical or cultural resources.

NO-ACTION ALTERNATIVE

This alternative does not have any impact on historical or cultural resources.

4.13.1 COORDINATION WITH STATE AND LOCAL HISTORIC PRESERVATION AGENCIES

There has been coordination of the Turnaround Project with the State Historic Preservation Office, the Northwest Archaeological Survey Office, and the San Francisco Landmarks Preservation Advisory Board.

At the request of the California State Historical Preservation Office (SHPO), a literature research for the historic and archaeological resources in and around the project area has been prepared (see San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887 (Reference Document 10). SHPO also requested that MUNI files from the 1978-1980 period on this project be reviewed. The files were reviewed and the results presented to SHPO. In further preparation of this DEIS, the Northwest Regional Archaeological Survey was also consulted to research possible archaeological resources in the project area. Reference Document 10 reports the result of this research. The Turnaround Project was also coordinated initially with the Landmarks Preservation Advisory Board to review project survey data and discuss the status of resources in the project area.

4.14 PARKLANDS (SECTION 4(f) COMPLIANCE)

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Justin Herman Plaza. The Surface and Underground Alternatives would not directly take any parkland from Justin Herman Plaza, but both alternatives would impact the park in the short term due to the proposed construction activities. Construction activities, even though temporary, will interfere with the existing use of the park by generating noise, visual, and air quality impacts.

In addition, construction activities may impact the landscaped trees and grass areas in the park. This is because a process called grouting must take place underneath Justin Herman Plaza. Grouting, which is the injection of a commercial clay type mixture to stabilize the fill material which exists underneath the park, is necessary in order to prepare the fill for tunneling. The grouting involves drilling holes of approximately 2.5 inches in diameter every 15 feet above the tunneling. A plastic tube is then inserted into the drilled hole and the grouting material is injected into the fill at a depth of ten feet below the surface (Frobenius, 1988). Grouting material is usually a bentonite mixture (commercial clay); however, other types of grouting material may be used including cement grout, which is a water and cement mixture, and chemical grout material, which is a sodium silicate mixture. Of the three types of grouting materials, the cement and the chemical grouting material may adversely affect tree roots if these materials come in contact with the roots. In consultation with the City of San Francisco Recreation and Park Department's Urban Forester, it was learned that the Justin Herman Plaza's tree and plant roots are primarily located within a depth of four feet. Therefore, if grouting is to take place beneath the ten foot depth level, as is proposed, grouting should cause no problem to landscaped trees and plants in the Plaza (Cooney, 1988).

The only potential impacts to the Justin Herman Plaza's landscaping will occur where soil is disturbed for drilling purposes. There is also a possibility that tunneling construction activities underneath Justin Herman Plaza may cause slight subsidence of the area directly above where tunneling is to take place. This area will subside uniformly about one or two inches over a period of 24 hours after tunneling takes place. However, this amount of subsidence will not be noticeable. Subsidence of a maximum of another four inches (total six inches) may occur over a six month period but is not expected to be noticeable and, therefore, will not affect activities, landscaping, or structures within the park. However, there is the possibility of minute cracks in the cement in proximity to the area above the tunneling. In the event cracking of cement does occur, these cracks will need to be repaired (Frobenius, 1988).

The grouting process could take approximately three weeks within the Justin Herman Plaza and since, as previously mentioned, holes are to be drilled with plastic tubing inserted, for safety reasons, it may be necessary to sign or cordon the area of grouting. Other short term construction impacts include increased particulate emissions (dust) due to drilling in Justin Herman Plaza and also due to earthmoving activities near the Bayfront Promenade. In addition, increased pollutant emissions may occur due to the operation of gasoline and diesel powered equipment near the Plaza and Bayfront Promenade. There is a concern that the temporary increase in air particulate and pollutant emissions may adversely impact park users especially during the noon time period of 12 P.M. to 1:30 P.M. when it is estimated that approximately three to eight thousand people utilize the park (Ashe, 1988). The same concern is true for temporary noise construction impacts due to the proposed construction activities within the Justin Herman Plaza area (drilling and grouting) and in areas close to the southeastern part of the Plaza near the Bayfront Promenade where cut and cover construction and hauling of excavated material is planned to take place.

Because of construction activity related to tunneling and excavating, it may be necessary to schedule construction activities to avoid conflicts with revenue generating events permitted by the San Francisco Recreation and Parks Department.

Sections 3.6 and 4.6 of the EIS discuss in detail existing air quality in the vicinity of Justin Herman Plaza and Bayfront Promenade area and potential construction impacts as a result of the proposed alternatives. Sections 3.7 and 4.7 of the EIS discuss in detail the existing sound levels and potential temporary construction impacts which may occur as a result of the proposed construction activities in the area. The existing sound level in the area of the Justin Herman Plaza is approximately 69 decibels peak hour Leq. Construction activities in the Justin Herman Plaza will produce a temporary sound level of 80 to 90 decibels at the southeastern part of the park where hauling of excavation material and cut and cover construction is to take place. This noise will be clearly audible and a source of some potential disturbance to the public which utilizes the park especially during the noon hour time period (12:00 to 1:30 P.M.), and also to those who utilize the Plaza for activities and events.

Bayfront Promenade. Alternatives 1 and 2 would not directly take any parkland from the Promenade but both alternatives would impact the Promenade temporarily due to the proposed construction activities. The proposed construction activities could create temporary increases in air pollutant and particulate emissions and in ambient sound levels. However, these impacts are mitigable and temporary, lasting only for the duration of construction activities up to 36 months, and are not considered significant (Rossi, 1988).

Rincon Point Park. Alternatives 1 and 2 would not impact the proposed Rincon Point park in the short term because the proposed MUNI Turnaround construction activities will take place before the proposed Rincon Point park is developed (Conrad, 1988).

Historic Resources. Alternatives 1 and 2 will both impact the Old Sea Wall and the Belt Line Railway as discussed in Section 4.13 Historic and Cultural Resources (Section 106 Compliance). Alternatives 1 and 2 would appear to have no adverse effects on other historic properties within the area that are potentially eligible for or listed on the National Register of Historic Places. Section 4.13 of the DEIS, discusses the effects of these alternatives on historic resources in detail.

Archaeological Resources. The level of analysis that has so far been completed suggests that there will be no Section 4(f) involvement with archaeological resources. Section 4.13 of the EIS, Historic, Archaeological and Cultural Impacts (Section 106 Compliance) discusses the potential effects of construction activities upon historic store ships and artifacts that may be uncovered during cut and cover construction.

LONG TERM. It is not anticipated that there will be any long term impacts upon Bayfront Promenade, or the proposed Rincon Point park as a result of any of the proposed alternatives; however, there is a potential for a long term impact upon Justin Herman Plaza as a result of both of the proposed alternatives. This long term impact is the noise generated by the planned tunnel emergency exhaust fan. Section 4.7-3, Noise Impacts, states that the exhaust fan will produce a predicted sound level of 80 dBA adjacent to the exhaust opening at the south end of Justin Herman Plaza. The fan is to be operated for one hour per month. Even though the San Francisco City Noise Ordinance does not contain specific absolute limits on the noise from stationary equipment which occur at parks as receptors, the ordinance does contain a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by five dBA or more. Since the nuisance ordinance recommends noise levels to be limited to 60 dBA or lower, noise attenuation of at least 30 dBA is therefore going to be needed for this exhaust fan.

Mitigation

SHORT TERM. Alternatives 1 and 2 both have the same short term construction impacts upon the park and recreational land (Justin Herman Plaza, Bayfront Promenade, and the proposed Rincon Hill Park) discussed in this section. The measures presented below are intended to ensure that all possible planning, appropriate to this state of decision making, takes place to minimize adverse effects.

No specific mitigation measures are presented at this time for historic and archaeological resources since there does not appear to be any Section 4(f) involvement. If more detailed analysis proves this assumption incorrect, mitigation measures will be given in the Final EIS 4(f) evaluation. These resources will, of course, receive the full protection mandated for them under the Section 106 process. Mitigation measures for parks and recreational lands are listed below by each Section 4(f) land. The mitigation measures address the short term temporary construction impacts since no long term impacts have been identified.

Justin Herman Plaza. The emphasis for mitigation at this site would be (1) to minimize the short term temporary construction impacts of pollutant and particulate emissions and noise impacts upon the public who use and enjoy the plaza especially during the noon lunch period between 12:00 P.M. and 1:30 P.M.; and (2) to minimize any potential impact of grouting upon landscaped trees and plants within Justin Herman Plaza. The following measures are, therefore, recommended for both Alternative 1 and Alternative 2 which would have identical short term construction impacts upon Justin Herman Plaza:

Spray water (if the San Francisco Water Department determines that this will be permitted in spite of drought conditions) or spray dust palliatives and vacuum sweep paved areas to control dust, if spraying of water is not permitted due to drought conditions. Also, dump truck loads should be covered with canvas or tarps when hauling excavated fill material to control dust. In addition, trucks should be kept off of dirt areas and on paved surfaces to minimize road dust.

Excessive idling of gasoline and diesel powered construction equipment should be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

The timing of construction activities within the Plaza should be coordinated with the San Francisco Recreation and Parks Department to coincide with a time period of little or no activities planned for the Plaza. This measure will reduce the amount of potential revenue loss to the Recreation and Parks Department since they can schedule events and activities ahead of time.

A six foot high temporary acoustical barrier in the form of a solid wood fence should be installed along the property line in the vicinity of the southeastern corner of the Plaza. If the placement of the six foot temporary acoustical wood barrier proposed creates any visual or shadow impacts, a Lexan plastic transparent acoustical barrier can be placed instead of the wood barrier. This type of barrier would not create visual impacts since it is transparent. Further mitigation for minimizing visual impacts of the temporary acoustical barrier would be a landscape treatment on the park side of the fence as specified by the City of San Francisco Recreation and Park Department. This barrier will reduce the construction noise impacts of the cut and cover construction in the Embarcadero Roadway to an acceptable level (between 72 and 80 decibels) so that the public will be able to use the Plaza during the noon lunch hour and for scheduled events and activities. Also, to the extent possible, construction activity within Justin Herman Plaza and the vicinity of the plaza should cease during the noon lunch period between 12:00 P.M. and 1:30 P.M. in order to not disturb the public who uses the plaza for lunch at that time. Also in order to reduce noise impacts from construction activities the diesel driven air compressor should be located as far away as possible from the parkland and should be provided with temporary shielding around it.

Even though grouting will take place below depths where tree and plant root system are located, only a clay mixture (bentonite) grout, rather than a cement or chemical grout, should be used during the grouting process. Also, if any trees or plants are damaged or disturbed by the grouting process they shall be replaced with trees and plants of suitable size, type and density to provide visually aesthetic landscaping. These planting materials will be specified by the City of San Francisco Recreation and Park Department. In addition, upon completion of the drilling process, remedial action must be taken to restore the grass and soil where drilling holes have been emplaced.

Gradual subsidence of parkland over the proposed tunnel to as much as six inches could potentially affect drainage patterns, paved surfaces and create potentially hazardous conditions. As a mitigation, any affected area of the Plaza should be brought back to its original condition following construction and also following one year of postconstruction monitoring.

Bayfront Promenade. The emphasis for mitigation at this site would be to minimize temporary construction impacts associated with noise, particulate and pollutant emissions, and access. The following measures are recommended for both Alternatives 1 and 2:

Spray water (if the San Francisco Water Department determines that this will be permitted in spite of drought conditions) or spray dust palliatives and vacuum sweep paved areas to control dust if spraying of water is not permitted due to drought conditions. In addition, dump truck loads should be covered with canvas or tarps when hauling excavated fill material to control dust and trucks should be kept off of dirt areas and on paved surfaces to minimize road dust.

Excessive idling of gasoline and diesel powered construction equipment should be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

Also in order to minimize noise impacts of construction, all construction equipment and related vehicles such as hauling trucks should be properly muffled. In addition, as part of standard construction procedures, temporary access would be provided across the Embarcadero Roadway by decking the roadway so that pedestrians can continue to get to the Promenade.

LONG TERM. To mitigate the potential sound level impacts which will be created by the tunnel exhaust fan, an appropriate sound attenuator should be provided. It is recommended that the attenuation provide a sound level reduction of at least 30 dBA so as not to exceed a fan sound level of 60 dBA at the Justin Herman Plaza.

TSM AND NO ACTION ALTERNATIVES

Impacts

Alternative 3 and Alternative 4 would not directly or indirectly impact any of the three 4(f) parkland properties identified (i.e., Justin Herman Plaza, Bayfront Promenade, and the proposed Rincon Point Park). This is because the No Action Alternative and the Transportation Systems Management (TSM) Alternative do not involve any construction activity that would affect the 4(f) properties described above.

4.15 POTENTIAL SECONDARY IMPACTS OF THE MUNI METRO TURNAROUND PROJECT

As stated previously, although the Turnaround Project does not include the proposed southern extension of MUNI Metro to Mission Bay, it does facilitate the construction of the Extension. The Turnaround Project build alternatives provide the track and portal construction which would allow further extension of surface track along the median of the Embarcadero Roadway and King Street to Mission Bay at Sixth Street.

The Extension, described in Section 3.4.4, would serve as the principal transit link between the Central Waterfront/Financial District and Mission Bay, providing four high platform stations in the Rincon Point, South Beach, and China Basin areas

Its construction would be accomplished as part of the Embarcadero Parkway project since the entire route to Sixth Street would follow the Embarcadero Parkway and redesigned King Boulevard. Construction of the Parkway is scheduled to begin in 1991-1992.

Because the Extension is considered a likely secondary impact of implementing the build alternatives, the Environmental Impact Statement highlights the impacts to be anticipated from construction and operation of the Extension. The potential impacts have been identified in the I-280 Transfer Concept Environmental Impact Report (CALTRANS, 1984) and are summarized below.

IMPACTS

Short Term. Construction of the MUNI Metro Extension to the vicinity of Sixth and King Streets would cost approximately $15 million. No Federal funds are expected for construction of the Extension. The Extension would be built entirely on the surface and would require temporary relocation or accommodation of traffic, parking, and goods movement, particularly along The Embarcadero. Slowed traffic movements could result in higher auto emissions and reduced Levels of Service along The Embarcadero. Access to Port of San Francisco piers and other activities along the Waterfront south of the Bay Bridge may be disrupted. Four stations, including one at Hills Plaza, would be constructed as part of the Extension project, and their construction could produce temporary access problems to ongoing development at Rincon Point and South Beach.

Temporary disturbance to commercial and residential places near the construction area due to increased noise levels could also occur. Additionally, the excavation of the existing roadway, installation of base aggregate, ties, rails, and regrading with asphalt or concrete would be necessary and may engender dust and vibration. Beneficial impacts would result from creation of temporary employment in the building trades.

Long Term. The Turnaround Project would produce secondary impacts related to MUNI Metro operations at the western portals of the Market Street subway, i.e., Duboce and West Portal. Portal operation during peak periods currently involves coupling of trains, requiring cars from one line to wait for cars from one or two other lines to form three and four car trains before entering the subway. Delays caused by holding and coupling of cars at the portals disrupt Metro's reliability and produce unscheduled gaps in service. The Turnaround Project would minimize portal delays by allowing ten additional trains per hour to travel in the subway, thereby reducing the need to couple cars before they enter the subway.

Long term, secondary impacts would also result from the extension of MUNI Metro to Mission Bay. The Extension would provide increased marketability of residential uses in the Rincon Point, South Beach and Mission Bay areas, greater access between China Basin/Central Waterfront and downtown, improved links to regional transit (e.g., the Peninsula Commute Service and BART), and decreased travel times. The Hills Plaza Station would serve future activities at Piers 24 and 26, the new Rincon Point park and proposed hotel nearby and Rincon Hill residences. It is anticipated that the Extension would allow MUNI Metro to absorb the projected ridership growth along the Central Waterfront and increase MUNI's share of the modal split for trips to and from the Waterfront area.

The Extension would require approximately eight additional light rail vehicles over and above those operating as a result of the Turnaround Project, an additional storage facility, and increased operating costs. Added rail storage and maintenance requirements would be attributable to the Extension as well as the Turnaround Project, J-line Connection, and the F-line. Because of street crossings and planned preempted signalization in favor of MUNI Metro, delays and queuing of autos could result during peak periods, most notably at the intersections of Embarcadero/Bryant and King at Third and Fourth Streets.

4.16 CUMULATIVE IMPACTS

The Turnaround Project is a capital improvement program to enhance the rail transit capacity of the San Francisco Municipal Railway Metro system and to reduce the cumulative impacts associated with central business district development permitted under the Downtown Plan. By improving the operational capability of the Metro system and expanding capacity, the Turnaround Project serves as a primary element in increasing public transit use as a part of the City's transit first policy. This transit capital improvement project allows San Francisco land use plans and policies to be carried out by enhancing transit capacity and minimizing negative transportation impacts associated with downtown development.

The Turnaround Project also serves as an element of Waterfront transportation projects to improve circulation along the Northeastern Waterfront and in the Rincon Point/South Beach and China Basin areas. The other related transportation projects are:

- Embarcadero Parkway
- I-280 on and off-ramp redesign
- MUNI Metro Extension to Mission Bay
- F-line streetcar service along Market Street and The Embarcadero to Fisherman's Wharf

The Waterfront transportation projects are described as integral elements of the forthcoming South of Market Plan and Mission Bay Draft Environmental Impact Report, both scheduled for publication in August, 1988. Trip generation and MUNI capacity statistics utilized in these two documents assume that both the Turnaround Project and MUNI Metro Extension to Mission Bay are in place by the Year 2000. Earlier documents, such as the Rincon Hill Final Environmental Impact Report (1984) and the Rincon Point/South Beach Redevelopment Plan (1980, 1984), also cite the need for the MUNI Metro Extension and Embarcadero Parkway project.

The Embarcadero Parkway is the key element in the plans for circulation improvements along the Waterfront. Redesign of the Embarcadero Roadway into a treelined parkway will offer the opportunity to construct surface rail along the right-of-way, to enhance the Waterfront environment, and to facilitate traffic movement along the Waterfront to the I-280 freeway via King Street, which will also be redesigned as part of the Parkway project. The realignment of The Embarcadero could permit Justin Herman Plaza to be enlarged and allow for the creation of a Waterfront park at Rincon Point.

The Parkway project, administered by the San Francisco Department of Public Works, would include funding for displacement of existing land uses between Howard and Folsom east of Steuart Street; for removal and replacement of affected Belt Line track; for mitigating access-related construction impacts; and for streetscape, signalization, and intersection improvements. Additional funding would be provided by CALTRANS to remove the stub end of the I-280 freeway between Third and Sixth Streets and to construct new on- and off-ramps linking I-280 with King Boulevard.

The proposed MUNI Metro Extension, funded and managed through PUC capital grants, would follow the median of the Embarcadero Parkway south to Sixth and King, allowing sufficient space to construct high level inbound and outbound loading platforms at four locations.

North of Howard Street, the Parkway design is more confined due to the existing elevated freeway structure of Highway 480. Because San Francisco voters approved a November, 1986, ballot measure to retain the elevated freeway structure, the Embarcadero Parkway and F-line design must conform with the freeway's alignment and support piers from Howard to Broadway. The design for this segment of the Parkway will be determined in the Embarcadero Project Urban Design Study to be published in September, 1988. Schedule for the combined Waterfront transportation projects is presented in Figure 4.16-1.

Since the Embarcadero Parkway is being designed to improve traffic circulation without increasing roadway capacity, it would provide beneficial impacts to the adjacent planned development and to the Waterfront, but could not accommodate increased traffic (see Section 4.4, Traffic and Transportation). Additional trips created by the new residential and commercial development in Rincon Point, South Beach, and Mission Bay would, therefore, be absorbed by transit, particularly the MUNI Metro Extension.

If MUNI Metro is extended to Mission Bay, 6,230 to 8,500 P.M. peak riders and over 20,000 daily riders would be expected to ride south of the Turnaround (DKS Associates, 1987). Currently, only one MUNI line, the 32-Embarcadero, serves the Embarcadero corridor between Market and King Streets. This line has a capacity of 610 places per two hour peak period (Figone, MUNI Planning and Schedules Department, 1988). The extension of MUNI Metro would be beneficial to the ongoing and planned development in Rincon Point, Rincon Hill, South Beach, and Mission Bay by providing over 2,600 additional peak period places for commuters and residents in these areas, and for Peninsula Commute Service riders transferring at Mission Bay (Manuel Padron & Associates, 1987).* The added transit accessibility is expected to shift trips from auto to transit.

The Extension would, however, create added visual impacts along the Embarcadero Parkway, particularly at each station location. The number of passing trains, for example, at the Hills Plaza Station between Folsom and Harrision Streets, is planned to be 18 per hour during peak periods and 12 during the midday. Additionally, traffic queuing may result at Bryant and The Embarcadero because of signal preemption in favor of MUNI Metro at that intersection (DKS Associates, 1987).

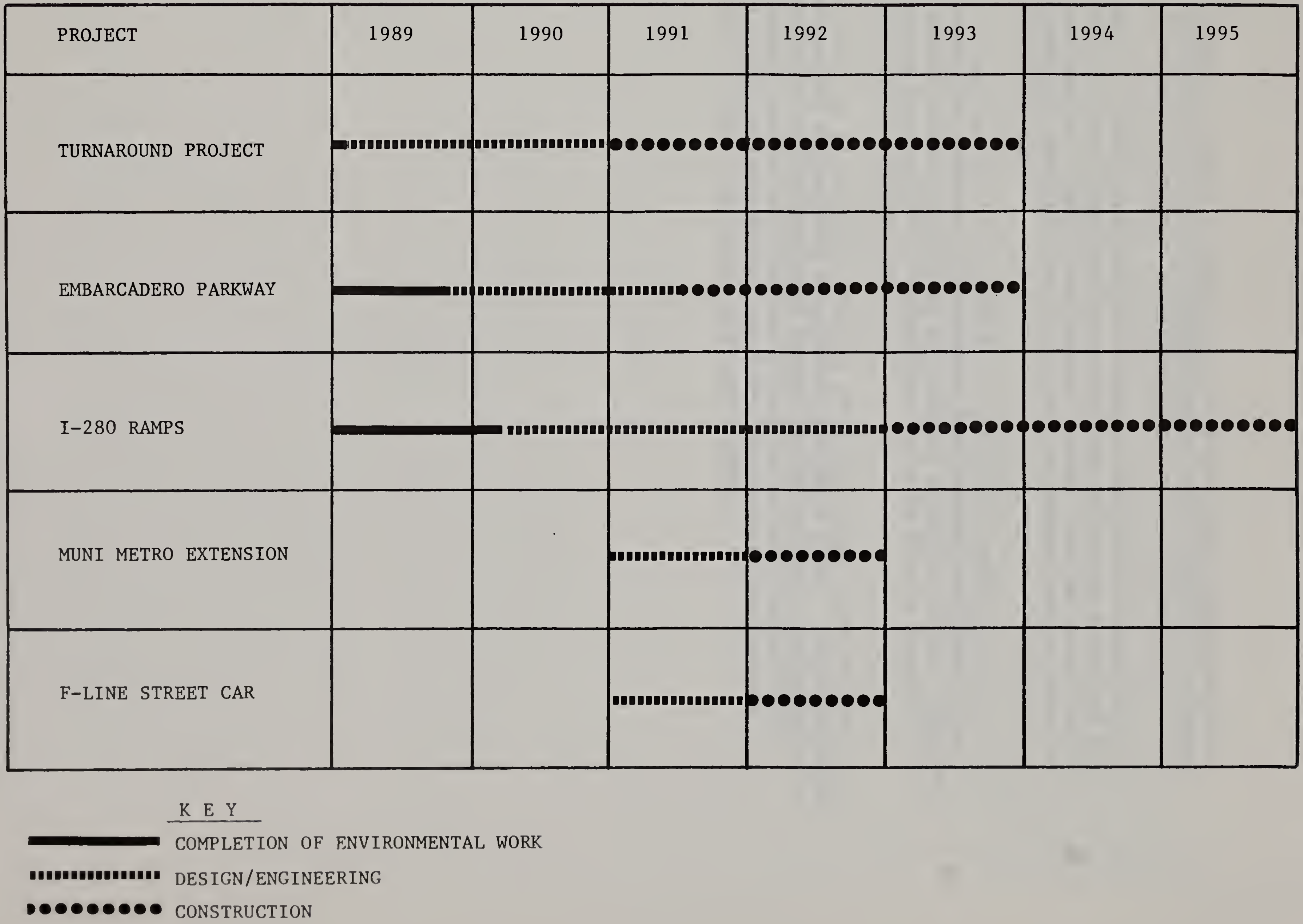
The proposed F-line extension from downtown San Francisco along Market Street to Fisherman's Wharf was adopted by the Public Utilities Commission and Board of Supervisors in 1983. As a result of this policy decision, the PUC approved a plan for the F-line to substitute for the proposed E-line streetcar, which would have operated along the Waterfront from Mission Bay to Fisherman's Wharf. The advantages of substituting the F-line extension to Fisherman's Wharf are:

1. The F-line was forecasted to carry 10,000 riders per day along The Embarcadero, and could easily absorb the 400 riders a day estimated for the E-line concept north of Market Street (San Francisco, I-280 Transfer Concept Program, 1985).

---

* The exact location of the Peninsula Commute Service (PSC) station in Mission Bay and the feasibility of extending PCS to downtown San Francisco are to be studied in a forthcoming EIS, prepared jointly by UMTA and the Joint Powers Board, which is planning for the future operation of the Peninsula rail services.

FIGURE 4.16-1 SCHEDULE FOR EMBARCADERO PARKWAY RELATED PROJECTS



2. Historic streetcars operating on the F-line would attract tourists traveling to and from Fisherman's Wharf, thus potentially relieving overcrowded conditions on the Hyde and Powell cable car lines.

3. MUNI has found that joint LRV/streetcar operation, as required by E-line service along the Waterfront south of Mission Street, to be problematic. Similar experience at Duboce Portal and along Church Street has indicated that joint operation creates service delays on MUNI Metro lines.

4. Frequent service on the MUNI Metro and F-line combined with a convenient transfer at Embarcadero Station would facilitate trips between Mission Bay and the Northeastern Waterfront without requiring direct service. The 32-Embarcadero bus could thus be abandoned as duplicative service.

Additionally, the F-line would become a principal transit link between downtown and the Northeastern Waterfront/Fisherman's Wharf. The F-line would be scheduled to provide sufficient capacity to absorb the annual increase in trips between downtown and Fisherman's Wharf and to carry the additional riders traveling between Mission Bay/South Beach and the Northeastern Waterfront (G. Bloom, PUC Bureau of Finance, 1988).

4.17 UNMITIGATED SIGNIFICANT IMPACTS

The sole unmitigated significant impact involves visual intrusions during the construction period. Specifically, cut and cover excavation with portal construction will occur along The Embarcadero to Howard Street. The Underground Alternative will have slightly greater visual impact since excavation will continue south of Howard Street. Both build alternatives will require the use of disposal and other heavy equipment at the tunnel excavation site adjacent to the MUNI bus turnaround. Hoses necessary for grouting work will be emplaced for a three week period on the grassy knoll in the southern end of Justin Herman Plaza.

CHAPTER 5

5. EVALUATION OF ALTERNATIVES

5.1 SERVICE IMPROVEMENTS

The Surface and Underground Alternatives, Alternatives 1 and 2, provide a more efficient turnback system to reverse Metro trains traveling in the Market Street subway. As a result of the improved turnback system, MUNI will be able to schedule an additional eight to ten trains traveling in the subway during the peak hour. The additional trains would provide sufficient capacity to accommodate existing and projected peak period demand through year 2005.

The Transportation Systems Management and No-Action Alternatives, Alternatives 3 and 4, do not adequately improve the turnback operation in the Market Street subway to operate significantly more trains than is currently scheduled during the peak. Although the TSM Alternative may allow a slight increase in the number of trains scheduled, neither alternative can be expected to provide sufficient capacity to meet City or ABAG demand projections for the year 2005.

5.2 SUMMARY OF SIGNIFICANT IMPACTS

5.2.1 SURFACE AND UNDERGROUND ALTERNATIVES

SHORT TERM

Construction related impacts are similar for both the Surface and Underground Alternatives. Short term mitigable impacts would occur in Justin Herman Plaza, along adjacent Port of San Francisco land, along the Embarcadero Freeway and Roadway between Mission and Howard, at the Bayfront Promenade, East Street Row buildings, MUNI bus turnaround, and at the existing BART/MUNI tunnel at Embarcadero Station. Additionally, Steuart Street between Howard and Harrison would experience construction activities, requiring closure of one traffic lane. Visual impacts related to construction are not mitigable in either alternative.

The difference in the respective short term impacts relate primarily to the extent of cut and cover construction required for the Underground Alternative. The subway portion of the Underground Alternative would extend one block beyond the portal for the Surface Alternative which would be north of Howard Street. The additional subway construction would affect a greater number of Embarcadero Freeway support piers, displace approximately 20 additional Port parking spaces, and create greater disruption to The Embarcadero/Howard Street intersection. The wider excavation along The Embarcadero between Mission and Howard Streets would also provide a slightly greater risk for ground subsidence and lateral movement, including cracking of the facades of adjacent buildings. Construction impacts for the Underground Alternative would last approximately four months longer than for the Surface Alternative.

The Surface Alternative, on the other hand, would affect an area further to the south, due to more extensive surface track and two at-grade turnback areas. As a result of the additional surface track, at-grade construction for the Surface Alternative would disrupt three surface intersections: Folsom/Embarcadero, Bryant/Embarcadero, and Harrison/Embarcadero. Additionally, the Surface Alternative portal location would conflict with a major telecommunications underground vault near Howard Street that could be costly to relocate. A less difficult relocation of water and sewer lines is associated with Underground Alternative at the intersection of Howard Street.

LONG TERM

Both Surface and Underground Alternatives would produce beneficial impacts to the MUNI Metro system by allowing more trains to travel during the peak period in the Market Street subway. Additionally, the build alternatives would facilitate construction of a new Metro station at Hills Plaza and the extension of MUNI Metro to Mission Bay. The differences in long term impacts between the two alternatives primarily reflect the requisite surface operation of Metro trains from Howard to Bryant Street in Alternative 1. The surface operation would necessitate closure of the Howard/Embarcadero and Harrison/Embarcadero intersections. The intersection at Folsom/Embarcadero would allow left turn movements from eastbound Folsom Street, and signal preemption favoring MUNI Metro would be installed. As a result of signal preemption, left turning auto traffic could queue during one or two of three signal changes during peak periods. Surface operation would also create mitigable visual and noise impacts to the proposed hotel and waterfront park at Rincon Point and to the residential units at Hills Plaza. Pedestrian circulation, also mitigable, would be impacted by surface turnback operation and a broadened Embarcadero Parkway.

Although the portal for the Underground Alternative would produce visual impacts to the hotel and waterfront park at Rincon Point, surface operation of Metro vehicles in this alternative would be greatly reduced and would occur only for temporary storage of disabled cars. Intersections at Embarcadero/Howard and Embarcadero/Harrison would also be retained for traffic circulation. Consequently, in the Underground Alternative, visual and noise impacts at Rincon Point would be insignificant and traffic circulation would not be affected at any intersection.

Capital and operational cost impacts for both alternatives are discussed below.

5.2.2 TRANSPORTATION SYSTEM MANAGEMENT AND NO-ACTION ALTERNATIVES

SHORT TERM

None.

LONG TERM

The two no-build alternatives do not significantly enhance turnback operations for Metro trains. As a result, sufficient numbers of trains would not be able to operate in the Market Street subway during the peak to accommodate 20 year ridership projections. MUNI Metro would, therefore, continue to operate at or above load factor standards during portions of the peak, discouraging potential riders from using transit. This potential shift from transit to other modes is in opposition to the City of San Francisco's transit first policy and the City's Master Plan.

5.3 CAPITAL AND OPERATING/MAINTENANCE COSTS

The capital cost (1988 dollars) to construct the Surface Alternative is nearly $20 million less than to construct the Underground Alternative (see Table 2.4-1). The lower cost for the Surface Alternative is a result of bringing the tracks to the surface as quickly as possible, thus minimizing the amount of costly cut and cover excavation required. When escalation of capital costs is considered, the difference in capital costs between Alternatives 1 and 2 increases from $19.869 to $30.427 million. The cumulative difference in annual operating expenses, which favors the Underground Alternative by $1.22 million to $1.85 million (1993 dollars), grows to $31 million over a 22 year period (see Table 4.3-3). Thus, the lower capital cost of Alternative 1 would be balanced by higher O&M costs in approximately 22 years.

The total cost of the alternatives may be compared utilizing UMTA's guidelines for annualizing costs. In this method, all initial capital costs are converted to annual costs and added to the O&M costs to yield a total cost (see Table 4.3-2). With this approach, the Surface Alternative is favored by $1.542 million per year ($10.162 million for the Underground Alternative compared with $8.620 million for the Surface Alternative).

There are additional cost factors associated with the construction of either alternative. The construction of the Surface Alternative would displace 120 parking spaces and the estimated revenue loss to the Port of $152,000. The construction of the Underground Alternative would displace 141 parking spaces and the estimated revenue loss to the Port of $371,300. Additionally, rewiring the trolley turnaround at the foot of Mission Street would cost approximately $250,000. These costs have already been included in the capital cost estimate.

Since much of the Surface Alternative is exposed on surface track, there is potentially greater risk for increased claims against MUNI and the City and County of San Francisco (i.e., personal injury claims, vandalism, and noise and visual intrusion claims by residences). Although the claims costs cannot be determined at this time, potential costs should also be included in the determination of the overall cost differences between the two alternatives.

5.4 LOCAL PRIORITIES FOR RAIL MODIFICATION PROGRAMS

The MUNI Metro Turnaround Project is at the top of the capital priority list in the Municipal Railway Capital Improvement Program 1987-92. The Regional Transportation Improvement Program also ranks the Turnaround Project as number one (Resolution #1815, Metropolitan Transportation Commission, May, 1987).

5.5 CAPITAL FUNDING PLAN

The capital cost (1988 dollars) of Alternative 1 is $71,795,000; Alternative 2 is $91,883,000. Additional capital costs associated with either alternative includes the following quantified miscellaneous costs: loss of parking revenues to the Port of San Francisco and costs to rewire, on an interim basis, the MUNI trolley bus turnaround at Steuart and Mission Streets. Potential miscellaneous costs include costs to BART to maintain service during the MUNI tunneling operation and costs resulting from construction conflicts between the Turnaround Project and other City projects, such as the Embarcadero Parkway, MUNI Metro Extension, and the MUNI F-line.

The construction financing for MUNI Metro Turnaround Project would be from three sources: Federal, State and local funds. The PUC intends to request discretionary UMTA Section 3 grant funds (Federal) to finance up to 75 percent of grant eligible project costs. The remaining 25+ percent would be financed by a mix of State and local funds. Discretionary State Guideway Program funds would finance 80 percent of the remaining 25 percent non-Federal funded project costs. The local share would be 20 percent of the remaining non-Federal funds in addition to those costs that would be designated as non-grant eligible costs. Local funding could be composed of a number of sources including regional funding administered by MTC, such as STA and Bridge Tolls net revenues, or from local sources such as SFMRIC, TIDF, General Fund or Hetch Hetchy capital resources (see Section 3.3.2).

REFERENCES/AGENCY CONTACTS

American Institute of Architects, San Francisco Chapter.

American Institute of Architects, San Francisco Chapter, The Embarcadero Plan (1986).

American Institute of Architects, San Francisco Chapter, Urban Design Study of the Embarcadero (1986).

Ashe, Peter, City of San Francisco, Department of Parks and Recreation, telephone communication (1988).

Association of Bay Area Governments.

Association of Bay Area Governments, Projections '85: Forecasts for the San Francisco Bay Area to the Year 2005, Population, Households, Income, Employment (1987).

Association of Bay Area Governments, Projections '87: Forecasts for the San Francisco Bay Area to the Year 2005 (1987).

Bechtel Letter B-153, Embarcadero Cost Comparison Study, Draft Engineering and Cost Report (1986).

Bechtel Letter B-157, Embarcadero Cost Comparison Study, MUNI Metro Operations (1987).

Bechtel Letter B-164, Operations Simulation Request #14, Revised Surface Turnback Without Extension (1987).

Bechtel Letter B-168, Draft Report, Folsom Street Crossing (1987-B).

Bechtel Letter B-172, Draft Report, Task #1, Justification of the 60 Second Design Headway Requirement (1987-C).

Bechtel Letter B-173, Draft Report, Task #4, Analysis of Midday Car Storage (1987-E).

Bechtel Letter B-174, Draft Report, Task #5, Analysis of Disabled Train Storage and Repair at Embarcadero (1987-F).

Bechtel Letter B-176, Draft Report, Task #7, Effects of the Mission Bay Extension on Operation of the Turnaround (1987-G).

Bechtel Letter B-179, Draft Report, Task #8, Analysis of Portal Location and Location of Turnaround Facilities on the Surface Extension (1987-H).

Bechtel Letter B-181, Draft Report, Task #10, Train Control and Vehicle Improvements (1987-I).

Bechtel Letter B-182, Draft Report, Task #2, Minimum Turnaround Time (1987-D).

Bechtel National Incorporated, Draft Report, An Evaluation of SELTRAC Automatic Train Control System (1987-A).

Beetle, George R., 2006 *Adjusted Schedule with 90 Second Turnaround: Request #11* (1986).

Beetle, George R., *Mission Bay Extension Revised Blocking Design*, December 8, 1986 (transmitted Bechtel Letter B-150, December 19, 1986).

Beetle, George R., *Train Operations Simulation Assessments* (Transmitted Bechtel Letter B-165, 1987).

Bloom, Gail, Public Utilities Commisison Bureau of Finance, telephone communication (1988).

California Air Resources Board (CARB).

California Department of Transportation, *I-280 Transfer Concept Program, Environmental Impact Report* (1984).

California Historical Society.

California Occupational Safety and Health Agency (CAL OSHA)

California Regional Water Quality Control Board, San Francisco Bay Region, Lester Fekman, internal memo and report, "Status of Toxics Cleanup Cases, North Bay" (1988).

California Regional Water Quality Control Board, San Francisco Bay Region, List "Fuel Leaks, San Francisco County" (1988).

California, State of, Bay Area Air Quality Management District.

California, State of, Bay Area Air Quality Management District, Bay Area Air Quality Plan (1979, 1982).

California, State of, Department of Transportation.

California, State of, *Department of Transportation, CalTrain Peninsula Commute Service 5-Year Plan, 1987-1992* (1987).

California, State of, Department of Transportation, *Interstate-280 Transfer Concept Program Environmental Impact Report* (1984).

California, State of, Director's Policy Statement (1987).

California, State of, Historic Preservation Office.

California, State of, Northwest Regional Archaeological Information Center.

California, State of, Office of Noise Control.

California, State of, Office of Planning and Research.

California, State of, Office of Planning and Research, An Urban Strategy for California (1978).

California, State of, Port of San Francisco.

California, State of, San Francisco Bay Conservation and Development Commission.

California, State of, San Francisco Bay Conservation and Development Commission, San Francisco Bay Plan (1969, 1979, 1983).

California, State of, San Francisco Bay Conservation and Development Commission, San Francisco Waterfront Special Area Plan (1975 as Amended).

California, State of, San Francisco Bay Conservation and Development Commission, Total Design Plan: San Francisco Waterfront, Piers 7-24 (Amended through May, 1986).

California, State of, San Francisco Bay Regional Water Quality Control Board.

California, State of, San Francisco Redevelopment Agency.

California, State of, State Lands Commission.

Carnegie Institution of Washington, State Earthquake Investigation Commission upon the California Earthquake of April 18, 1906, Atlas (1908).

Carroll, J., Engineer for Hyatt, personal communication to Dames & Moore (1988).

Clough, G.W. and Chameau, Jean Lou, "Seismic Response of San Francisco Waterfront Fills," Journal of the Geotechnical Engineering Division, ASCE, Vol. 109, pp. 448-506 (1983).

Coldwell Banker, Coldwell Banker San Francisco Commercial/Industrial Vacancy Rates.

Conrad, Tom, Chief of Planning, Redevelopment Agency of San Francisco, telephone communication (1988).

Cooney, Jim, Urban Forester, City of San Francisco, Department of Parks and Recreation, telephone communication (1988).

Dames & Moore, Environmental Assessment (confidential), Job No. 16912-001-043 (1988).

Dames & Moore, Factual Report, Site Investigation, MUNI Metro Turnaround Facility, 2 Volumes (1986).

Dames & Moore, Geotechnical Report, MUNI Metro Turnaround Facility, Phase IA, Preliminary Engineering (1988).

Dames & Moore, Preliminary Site History Report, MUNI Turnaround Project (1988).

Derleth, Charles, Jr., "Report by Professor C. Derleth, Jr.," Engineering News, Vol. 55, No. 13, pp. 503-504 (1906).

DKS Associates, MUNI Metro Turnaround Project Supplemental Technical Memorandum, "The Embarcadero Operation Analysis" (1986).

DKS Associates, MUNI Metro Turnaround Project Tasks 1A and 7A: Patronage Projections (1987).

Donnelly Marketing, Inc., Market Profile Analysis (1986).

Dow, Gerald Robert, Bay Fill in San Francisco (1973).

EDAW, MUNI Turnaround Draft Environmental Impact Report (1978).

Environmental Protection Agency (EPA).

Feldman, L. and Stephen Hill, California Regional Water Quality Control Board, San Francisco Bay Region, personal communication (1988).

Freeman, Luther, Municipal Railway Department of Strategic Planning, telephone conversation, 1988.

Frobenius, Peter, Civil Engineer, Bechtel, telephone communication (1988).

Gilbert, G.K., R.L. Humphrey, J.S. Sewell and F. Soule, "The San Francisco Earthquake and Fire of April 18, 1906 and Their Effects on Structures and Structural Materials," U.S. Geological Survey Bulletin 324, 170 p. (1907).

Hall, W.H., "Some Lessons of the Earthquake and Fire; A Record of Earthquake Disturbances," San Francisco Chronicle, Vol. 88, No. 125, p. 32 (1906).

Hendry, George W. and Jacob Bowman, The Spanish and Mexican Adobe and Other Buildings: San Francisco Bay Counties (n.d.).

Hopper, P., Chief Engineer, and W. Ginter, Vice President, Federal Reserve Building, personal communication to Dames & Moore (1988).

J. Porter Shaw Maritime Library and National Maritime Museum, San Francisco.

Kellogg, J., Port of San Francisco, personal communication to Dames & Moore (1988).

Lawson, A.C., et al., "The California Earthquake of April 18, 1906," Report of the California Station Earthquake Investigation Commission: Carnegie Institute, Washington, D.C. (1908).

Lum, L., San Francisco Department of Public Health (1988).

Manuel Padron & Associates, Evaluation of Revised Ridership Forecasts on Operating Plans (1987).

Manuel Padron & Associates, "Methodology for Detailed Evaluation of Alternatives," Letter, December 23 (1985).

Manuel Padron & Associates, "Revised Evaluation Matrix," letter dated January 17 (1986).

Manuel Padron & Associates, "Task 7-Revised Schedules for Mission Bay Extension" (1986).

McGraw Hill/Dodge, Engineering News, "Construction 1986 Profile of Annual Salaries and Labor Percentages" (1987).

Medberry, S., San Francisco Department of Public Municipal Works, personal communication to Dames & Moore (1988).

Metropolitan Transportation Commission.

Metropolitan Transportation Commission, Peninsula Mass Transit Study (1985).

Metropolitan Transportation Commission, Regional Transportation Plan for the Nine-County San Francisco Bay Area (1987).

Metropolitan Transportation Commission, San Francisco Bay Area Seaport Plan (1982).

Metropolitan Transportation Commission, Transportation Improvement Program (1988-1992).

MUNI Metro Task Force, San Francisco Municipal Railway, MUNI Metro Master Plan (1979).

Olmsted & Olmsted, San Francisco Waterfront, Report on Historical Cultural Resources for the North Shore and Channel Outfalls Consolidation Project (1977).

Olmsted, Robert R. and Nancy Olmsted, San Francisco Bayside: Historical Cultural Resource Survey (1982).

Olmsted, Robert R., Rincon de las Salinas y Potrero Viejo: The Vanished Corner (1981).

Onorato, B., San Francisco Fire Department, personal communication to Dames & Moore (1988).

Pastron, Allen G. (Editor), Behind the Seawall: Historical Archaeology Along the San Francisco Waterfront (1981).

Pastron, Allen G., Report on the Potential for Cultural Resources Within the C-3 Contract Area of the Channel Outfalls Consolidation Project (1977).

Port Commission of the City and County of San Francisco: Official Statement Relating to Revenue Bonds (1984).

Port of San Francisco.

Port of San Francisco, "List of Underground Storage Tanks" (1988).

Port of San Francisco, Maritime Strategy II (1979).

Port of San Francisco, Memorandum to Bob Wood, Bechtel, from Randy Rossi, "Parking Displacement and the Embarcadero Parkway/MUNI/Park Project" (1987).

ROMA, Urban Design Analysis: I-280 Transfer Concept Program Working Paper (1983).

Rakestraw, Howard, MUNI Schedules Department, Quarterly Maximum Load Point Report (March, 1988).

Reed, J., Port of San Francisco, personal communication (1988).

Rossi, Randy, Director of Planning, Port of San Francisco, telephone communication (1988).

San Francisco Architectural Heritage Foundation, Splendid Survivors, San Francisco's Downtown Architectural Heritage (1979).

San Francisco Chamber of Commerce Small Business Advisory Commission, Mark W. Buell, San Francisco Downtown Office Building Occupancy by Size and Standard Industrial Classification (1986).

San Francisco Chronicle, "PG&E's Big Probe for Hazardous Waste," p. 6, April 28 (1986).

San Francisco, City and County of, Art Commission.

San Francisco, City and County of, Consolidated Budget and Annual Appropriation Ordinance, Fiscal Year Ending June 30, 1988 (1987).

San Francisco, City and County of, Department of City Planning.

San Francisco, City and County of, Department of City Planning, Certification of Office Projects, Approved Since November 29, 1984, Annual Limit Adjustment, Second Annual Report (1987).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Central Waterfront Plan (1980).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Commerce and Industry Element (1978).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Energy Element (1982).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Environmental Protection Element (1973, 1974).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Northeastern Waterfront Plan (1980).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Recreation and Open Space Element (1985).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, Rincon Hill Plan (1985).

San Francisco, City and County of, Department of City Planning, Comprehensive Plan, San Francisco Downtown Plan (1984).

San Francisco, City and County of, Department of City Planning, *Comprehensive Plan, South of Market Plan* (1985).

San Francisco, City and County of, Department of City Planning, *Comprehensive Plan, Transportation Element* (1972, 1977, 1982)

San Francisco, City and County of, Department of City Planning, *Comprehensive Plan, Urban Design Element* (1971).

San Francisco, City and County of, Department of City Planning, *Mission Bay Proposal for Citizen Review* (1987).

San Francisco, City and County of, Department of City Planning, *Rules for the 1986-87 Approval Period of the Office Development Limitation Program* (Annual Limit), Adopted February 5, 1988.

San Francisco, City and County of, Department of City Planning, *South of Market Interim Zoning Controls* (1986).

San Francisco, City and County of, Department of Public Health, Files on Active, Inactive Cleanups, and Monitoring (1988).

San Francisco, City and County of, Department of Public Works.

San Francisco, City and County of, Department of Public Works, *Noise Ordinance*.

San Francisco, City and County of, Department of Real Estate.

San Francisco, City and County of, Department of Recreation and Parks.

San Francisco, City and County of, Design for Development, Rincon Point-South Beach Redevelopment Project (1980, 1985).

San Francisco, City and County of, *Downtown Plan* (1984).

San Francisco, City and County of, *Ferry Building Environmental Impact Report* (1982).

San Francisco, City and County of, Final Environmental Impact Report for the I-280 Transfer Concept Program in San Francisco, California (1985).

San Francisco, City and County of, Landmarks Preservation Advisory Board.

San Francisco, City and County of, Mayor's Office of Community Development, *Community Development and Housing Assistance Plan* (1987 and 1988 Final Draft).

San Francisco, City and County of, *Mission Bay Special Studies: Transportation Network* (1986).

San Francisco, City and County of, *Municipal Code: Park Code, Permit and Reservation Policy* (1986).

San Francisco, City and County of, Municipal Railway.

San Francisco, City and County of, Payroll Expense Tax and Business Tax Ordinances, as of December (1987).

San Francisco, City and County of, Port of San Francisco.

San Francisco, City and County of, Procedure for Hazardous Wastes Soil Analysis (1986).

San Francisco, City and County of, Public Utilities Commission, MUNI Metro Turnaround Embarcadero Urban Design Study (1987).

San Francisco, City and County of, Redevelopment Agency.

San Francisco, City and County of, Redevelopment Agency, Memorandum dated January 15, 1982, Isaacson to Sayre, "Citizen Participants, Case Reports Filed with State of California Office of Historic Preservation and Policy Statements" (n.d.).

San Francisco, City and County of, Redevelopment Agency, Rincon Point-South Beach Redevelopment Plan (1980, 1984).

San Francisco, City and County of, Redevelopment Agency, San Francisco Redevelopment 1987 Fact Book (1987).

San Francisco, City of, Police Code, Article 29, Section 2900, Regulation of Noise.

San Francisco Convention and Visitors Bureau, IACVB 1986 Convention Income Survey On-Site Expenditures for San Francisco Conventions (1987).

San Francisco Convention and Visitors Bureau, News, "Three New Hotels to Open in San Francisco This Year" (1987).

San Francisco Convention and Visitors Bureau, The San Francisco Visitors Industry 1978-86, prepared by Dirk J. Wasenam (1987).

San Francisco Municipal Railway, Daniel Rose and Leonard Olsen, Operating Issues and Strategies, TRB Special Report (1987).

San Francisco Municipal Railway, Capital Improvement Program 1986-91 and 1987-1992 (1986, 1987).

San Francisco Municipal Railway, MUNI Service Costing System, User Procedures Manual, October 21, 1985, with updated rates for F.Y. 1986/1987.

San Francisco Municipal Railway, Short Range Transit Plan, 1987-1992 (1987).

Sanborn Insurance Company Maps, 1886-87, 1899, 1913, 1929, 1948, 1950, 1965, 1987.

Santa Fe-Pacific Realty Company.

Schlocker, Julius, U.S. Geological Survey, "Geology of San Francisco North Quadrangle," Professional Paper 782 (1974).

Shaw, J. Porter Maritime Library, National Maritime Museum, San Francisco, Records of Gold Rush Storeships in San Francisco (n.d.).

Sorenson, Peter, U.S. Fish and Wildlife Service, telephone communication (1988).

Sparks, O.N., General Manager, Aero Delivery Service, personal communication to Dames & Moore (1988).

Spinetta, D., Captain, San Francisco Fire Department, personal communication to Dames & Moore (1988).

Sunga, M., California Department of Health Services, personal communication to Dames & Moore (1988).

Svedrup/Foster, Design Report for a Tract Extension and Turnaround for the San Francisco Municipal Railway (1988).

U.S. Army Corps of Engineers.

U.S. Department of Commerce, Bureau of Census, Census of Population and Housing, Census Tracts, San Francisco-Oakland, California Standard Metropolitan Statistical Area, 1960, 1970 and 1980.

U.S. Department of Transportation, Urban Mass Transportation Administration.

U.S. Department of Transportation, Urban Mass Transportation Administration, Draft Environmental Impact Statement - Market Street Subway MUNI Track Extension San Francisco (1978).

U.S. Department of Transportation, Urban Mass Transit Administration, Final Environmental Impact Statement, Los Angeles Rail Rapid Transit Project, Metro Rail (1983).

U.S. Department of Transportation, Urban Mass Transit Administration, Market Street Subway MUNI Track Extension San Francisco, Final EIS (1978).

U.S. Department of Transportation, Urban Mass Transit Administration, Procedures and Technical Methods for Transit Project Planning, Review Draft (1986).

U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment and Home Appliances (1971).

Wirth Associates, Portero 7: Phase I Cultural Resources Overview and Inventory (1979).

Wirth Associates, Portero 7: Phase II Archaeological Test Excavation (1979).

Wong, Dan, San Francisco Municipal Railway Service Planning Department, Memo to San Francisco Planning Department, dated April 7, 1986.

Youd, T.L. and S.N. Hoose, "Historic Ground Failures in Northern California Triggered by Earthquakes," U.S. Geological Survey Professional Paper 993 (1978).

Youd, T.L. and S.N. Hoose, "Liquefaction During the San Francisco Earthquake," Journal of the Geotechnical Engineering Division, ASCE, Vol. 102, pp. 425-439 (1976).

Zetner, G., California Regional Water Quality Control Board, San Francisco Bay Region, personal communication to Dames & Moore (1988).

GLOSSARY

AIR RESOURCES BOARD (ARB). A State board that is responsible for air pollution efforts. The board sets air quality standards, limits emissions from motor vehicles and coordinates activities of regional and local air pollution control agencies.

ALAMEDA-CONTRA COSTA TRANSIT DISTRICT (A-C) or (AC TRANSIT). A special district with bus service to parts of Alameda and Contra Costa counties. Also connects with Golden Gate Transit, S.F. MUNI, Amtrak, BART and the Transbay Terminal.

ASSOCIATION OF BAY AREA GOVERNMENTS (ABAG). A voluntary, joint powers, comprehensive regional planning agency for the San Francisco Bay Area, ABAG also reviews and comments on applications for a wide variety of Federal assistance programs.

AUTOMATIC TRAIN CONTROL (ATC). Computerized system of tracking and managing trains in subway operation.

BAY AREA. The region comprised of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Sonoma and Solano counties, all of which touch on San Francisco Bay.

BAY AREA AIR QUALITY MAINTENANCE DISTRICT (BAAQMD, also known as the Smog Board). A district with responsibility for monitoring air quality in the counties of Alameda, Contra Costa, San Francisco, Marin, Napa, San Mateo, Santa Clara and parts of Solano and Sonoma. The district has control over stationary sources of air pollution and automobile exhaust emissions.

BAY AREA RAPID TRANSIT DISTRICT (BARTD). A special district providing rail rapid transit and feeder bus service to parts of Alameda, Contra Costa and San Francisco counties and to Daly City in San Mateo County.

BAY CONSERVATION AND DEVELOPMENT COMMISSION (BCDC). San Francisco Bay Conservation and Development Commission, a State commission with power to review all proposals for Bay fill or Bay shore construction in a 100-foot strip around San Francisco Bay.

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS). Created by the State Legislature as the State agency responsible for state-wide coordination of multi-modal comprehensive transportation planning and the provision of the State highway system.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA). Enacted by California Legislature in 1970; requires that environmental analyses be prepared for all projects and plans proposed in California.

CALIFORNIA TRANSPORTATION PLAN (CTP). Contains state-wide transportation goals, objectives, and policies for all modes of transportation; the regional plans; transportation forecasts; environmental impact statements; and a state-wide implementation program (policy element only, adopted by State Transportation Board).

CAPACITY. The number of places - standing and seated - available on a transit vehicle.

CARPOOL. Vans or automobiles carrying three or more passengers.

CENTRAL BUSINESS DISTRICT (CBD). An area of a city that contains the greatest concentration of commercial activity.

CITIZENS ADVISORY COMMITTEE (CAC). A group of interested citizens organized to participate in a particular project or study.

CONSISTS. The number of cars joined together to form a train.

CORRIDOR. A passageway of land use and transportation activities having a specific location and character, and constituting a link in a network of other such corridors.

CUT AND COVER. Type of excavation used in subway construction that is open air with retaining walls used for support. The number of potential transit riders (existing or projected).

DWELL TIME. Time required to load and unload passengers at a particular transit stop.

ENVIRONMENTAL PROTECTION AGENCY (EPA). The federal agency administering environmental quality programs in air pollution, water quality, solid waste management and noise abatement.

EXCLUSIVE BUS LANES. Lanes reserved for buses only on a street, highway, bridge or tunnel.

EXPRESS SERVICE. A transportation service which provides higher speeds because of fewer stops to pick up passengers.

FEDERAL AID URBAN PROGRAM (FAU). A program funded by the Federal Highway Administration for either highway or transit capital improvements in specified urbanized or urban areas within the limitation established by Congress.

FEDERAL HIGHWAY ADMINISTRATION (FHWA). A component of U.S. Department of Transportation that carries out the highway transportation programs for that department.

FEEDER SERVICE. Local passenger pickup or delivery to express bus, commuter railroad or rapid transit.

METROPOLITAN TRANSPORTATION COMMISSION (MTC). Created by State Legislature in 1970 as the regional body responsible for multimodal comprehensive transportation planning for the nine county San Francisco Bay Area. Also responsible for review of applications for federal and state transportation grants and allocation of certain transportation monies.

MULTIMODAL. All modes (types) of transportation, i.e., transit, highways, air, water nonmotorized, goods movement, etc.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA). Enacted by Congress in 1969 to develop a policy for environmental protection. Agencies using Federal funds must determine if a proposal will have a significant impact on the environment, and if so prepare an Environmental Impact Statement.

NATIONAL RAILROAD PASSENGER CORPORATION (NRPC). (American Travel on Track) a for profit corporation responsible for the operation and maintenance of a nationwide intercity rail passenger system, excluding commuter services. (Same as AMTRAK.)

OFF PEAK PERIOD. The period in the day when the demand for transit and highway space is the least (noncommute hours).

PEAK PERIOD. The period in the day when the demand for transit service and highway space is the greatest (commute hours).

PORTAL. The place where trains enter or leave a subway.

RAIL RAPID TRANSIT. Passenger trains propelled by on board electric motors drawing power from a third rail or other external power source. Has exclusive grade separated right-of-way and platform loading at stations.

REGIONAL TRANSPORTATION PLAN (RTP). Adopted by MTC in 1973; contains goals, policies, objectives, and a financial plan to guide transportation development for the nine county Bay Area.

RIGHT-OF-WAY. The strip of land over which a transportation facility such as a highway or transit line is built.

SAN FRANCISCO MUNICIPAL RAILWAY (MUNI). Operates buses, streetcars, cable cars and trolley coaches in San Francisco and a portion of Daly City, including service to the Bay Area Rapid Transit District's system.

SAN MATEO COUNTY TRANSIT DISTRICT (SAMTRANS). A special district in San Mateo County which provides bus service to most cities within the County, including connecting service to BART, SCCTD, SP and SFO.

SCISSORS. Type of crossover allowing trains to change tracks.

FIXED GUIDEWAY SYSTEM. A transit system with an exclusive passageway and vehicles which cannot operate off the passageway (passageway may be elevated track or subway, or grade separated road).

FREEWAY. A highway with full control of access, with all crossroads grade separated and interchanges with major crossroads.

FROG. Switching device for rail lines.

GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT (GGBHTD). A special district which provides bus and ferry service for Marin and parts of Sonoma County and operates and maintains the Golden Gate Bridge.

GRADE SEPARATION. Separation of intersecting streams of traffic by crossing structures or underpasses.

GUIDEWAY. A supporting physical structure in or upon which transit vehicles travel.

HEADWAY. The time interval between two public transportation vehicles traveling in the same direction on the same route.

INTERFACE. Transfer activity and the facilities required for transfers between transportation systems.

LEVEL OF SERVICE (LOS). Description of circulation at a particular intersection, ranging from fire flow to stop and go conditions.

LIGHT RAIL VEHICLE (LRV). Electrically powered transit vehicles running on rails for guidance and traction i.e., the modern street car. Each vehicle can be coupled with other LRVs forming trains.

LOAD FACTOR. Standard to determine whether transit service is operating at or overcapacity.

MASS TRANSIT. A public or private service with the capability of transporting a large number of people.

MEDIAN. The protected middle area of a multilane roadway often used for transit operation.

MEMORANDUM OF UNDERSTANDING. A legal agreement entered into between entities to carry out joint programs or projects.

METRO. Term used for rail rapid transit in various areas i.e., Washington, D.C., MUNI Metro in San Francisco.

SOUTHERN PACIFIC TRANSPORTATION COMPANY (SP). A private for profit corporation responsible for the operation and maintenance of an interstate freight service and commuter services in the westbay corridor between San Francisco and San Jose.

TAIL TRACK. Short track at end of rail line used for vehicle storage or reversing train direction.

TERMINAL. An area or building serving transportation facilities for the picking up, transfer or discharge of passengers or goods.

TRANSPORTATION DEVELOPMENT ACT (TDA). A State law enacted in 1971. Funds are generated from a tax of one quarter of one percent on all retail sales in the region. Funds are primarily used for transit purposes by MTC's allocation back to the county of origin in accordance with the California Administrative Code (TDA Rules and Regulations).

TRANSPORTATION SYSTEMS MANAGEMENT ELEMENT (TSME). A component of the RTP which contains a listing of low capital projects designed to improve the capability of the existing transportation systems. The TSME also describes the planning and evaluation process leading to the selection of projects for implementation.

URBAN MASS TRANSPORTATION ADMINISTRATION (UMTA). A component of the U.S. DOT that assists in the development of improved mass transportation facilities, equipment, techniques, and methods; encourages the planning and establishment of areawide urban mass transportation systems; and provides assistance to State and local governments in financing such systems.

U.S. DEPARTMENT OF TRANSPORTATION (US DOT). The Federal department that deals with overall transportation planning, programming, budgeting, technology, and policy.

VOLUME. Number of riders traveling on a transit line or lines at a particular time and place.

LIST OF PREPARERS

EARTH METRICS

C. Michael Hogan, Principal-in-Charge of environmental analysis; Ph.D., 23 years experience.

Gary S. Deghi, Senior Project Manager; M.S.; 13 years experience; Manager of environmental analysis.

Mark Weisman, Project Manager, Transportation Planner; M.A.; 10 years experience.

Sepehr Haddad, Environmental/Economic Analyst; B.S., M.S.; seven years experience.

Ballard W. George, Acoustical Engineer; M.A.; 31 years experience.

Greg Grunner, Environmental Scientist; B.S.

Peter Geiger, Environmental Scientist; M.S.

Paul Hoffey, Environmental Scientist; B.S.; three years experience.

Cynthia Roessler, Biologist; B.A; four years experience.

BECHTEL NATIONAL, INCORPORATED

Robert E. Clemons, Project Manager; 27 years experience; civil engineer.

Peter Frobenius, Project Engineer; 27 years experience; civil engineer and geotechnical.

Ching Wu, Assistant Project Engineer; structural and civil engineer.

Shirley L. Douglas, Environmental Reviewer, 16 years experience, Urban Planner.

DAMES & MOORE

Robert D. Darragh, Partner; geotechnical engineer; 25 years experience.

E.M. ROSE & ASSOCIATES

Edward M. Rose, Principal; B. Arch., M.V.P.; Project Manager; Land Use and Planning, Urban Design, Historical and Cultural Resources; 18 years experience.

Daniel J. Weaver, Environmental Planner-Historian; Ph.D.; 10 years experience.

Rodger Zeman, B. Arch.; Graphic Illustrator.

J. WARREN & ASSOCIATES

John Warren, Principal, Transportation planning and engineering.

THERESA HUGHES & ASSOCIATES

Theresa Hughes, Principal, economist.

Adam Lehmann, Research Assistant, Associate Planner.

T.Y. LIN INTERNATIONAL

Dennis Pu, Principal-in-Charge.

Eric Chan, Project Manager.

H.S. Lu, Project Engineer.

URBAN MASS TRANSPORTATION ADMINISTRATION, SAN FRANCISCO REGIONAL OFFICE

Carmen Clark, Senior Community Planner.

APPENDICES

I. NOTICE OF INTENT

II. AGENCY RESPONSE TO THE NOTICE OF INTENT

III. SUMMARY OF APPLICABLE PLANS AND POLICIES
REQUIRED PERMITS AND APPROVALS

APPENDIX I

FEDERAL REGISTER

September, 1987

NOTICE OF INTENT

to Prepare an Environmental Impact Statement

U.S. DEPARTMENT OF TRANSPORTATION

Urban Mass Transportation Administration

and the

San Francisco Public Utilities Commission

SUMMARY Pursuant to the National Environmental Policy Act (42 U.S.C. 4321) and the Council on Environmental Quality's implementing regulations (40 CFR Part 1500), the Urban Mass Transportation Administration (UMTA) gives notice that an Environmental Impact Statement is being prepared for the proposed San Francisco Municipal Railway (MUNI) Metro Turnaround Project in downtown San Francisco, California. The MUNI, an operational branch of the City and County of San Francisco's Public Utilities Commission (PUC), proposes to construct a turnaround facility for the Market Street subway with UMTA Federal capital grant assistance and local funding. The proposed action would provide a more efficient and flexible track configuration beyond the downtown terminus of the existing MUNI Metro subway.

FOR FURTHER INFORMATION CONTACT: Ms. Carmen C. Clark, UMTA Region IX, 211 Main Street, Suite 1160, San Francisco,. California 94105; telephone (415) 974-7317 or Mr. Everett M. Hintze, Utilities Engineering Bureau, San Francisco PUC, 1155 Market Street, San Francisco., California 94103; telephone (415) 554-0706.

Project Description/Objectives The existing stub and track arrangement at the San Francisco Municipal Railway Metro level of the Embarcadero Station constrains the Metro from meeting existing and future headways during peak hours. The MUNI Metro Turnaround Project is designed to construct a turnaround facility for the Market Street subway to provide a more efficient turnaround arrangement. This will allow MUNI to:

Provide additional capacity to accommodate the growth in ridership on the existing Metro System as forecast by the City for the year 2007.

Provide the opportunity to reduce coupling of trains at West Portal and Duboce Portal, thus reducing passenger delays and operating expenses.

Improve operating reliability by nominal cost changes to the vehicles and signal system.

While the proposed action would allow for a future southerly extension of the MUNI Metro System, such extension is not being considered as part of this proposed action.

Alternatives A previous scoping meeting was held on March 5, 1986 to consider four all-underground alternatives based on the City's preliminary operating requirements. Studies since then have finalized these requirements and have allowed the development of simpler and less costly alternatives including the location of the turnaround on the surface.

A range of alternatives will be considered and evaluated in the EIS:

No action alternative.

A transportation system management alternative consisting of operational improvements to existing infrastructure.

Surface turnaround facility in the median of the realigned Embarcadero Parkway.

Underground turnaround facility beneath the Embarcadero.

Probable Effect. Construction of both the surface and underground alternatives would involve tunneling under lower Market Street and Justin Herman Plaza to minimize surface impacts. The surface alternative would use open cut construction from the south side of the Plaza to Howard Street and surface construction in the median of the realigned Embarcadero from Howard to Bryant Streets. The construction of the underground alternative involves open cut construction from the south side of the Plaza to Howard Street with a short tail track on the surface south of Folsom Street. Construction impacts would include noise and vibration, traffic and pedestrian disruption, interruption of access to businesses and parking areas, potential for movements of BART tunnels, potential for settling of some adjacent buildings, and potential disturbance of buried archaeological resources that could be in the area. Construction of the surface facility along the Embarcadero would also include potential impacts to the Embarcadero freeway structures and existing buildings within the proposed alignment; and facility operations could have long term effects of circulation disruptions and increased noise. Beneficial impacts resulting from improved transit service will also occur.

Several other transportation projects are planned within, or adjacent to, the project area. While the proposed MUNI Metro extension to the CALTRAIN Station at Fourth and Townsend Streets is considered a secondary impact, other related projects such as the Embarcadero Parkway Project from King Street to North Point Street, the proposed MUNI F-Line extension northward to Fisherman's Wharf, and construction of new on and off ramps to the I-280 freeway, while not dependent on the turnaround project will be implemented within the same time frame and therefore the cumulative effects of the these projects will be addressed.

Scoping A scoping meeting is scheduled for September 22, 1987 at 7 p.m., Port Commission Hearing Room 3100, Ferry Building, Embarcadero at Market Street. An information packet which gives more detail on the project and expected impacts is available to the public at the Utilities Engineering Bureau, San Francisco Public Utilities Commission, 1115 Market Street. Written comments germane to the scope of the EIS will be accepted by UMTA for a period of thirty (30) days from the date of this notice. Commentors may comment on the alternatives to be considered or propose additional social, economic, or environmental impacts to be evaluated. Commentors proposing additional impacts to be evaluated should indicate which alternatives are expected to generate these impacts and give specific reasons why the impacts may be significant. Comments may be sent to UMTA or San Francisco PUC at the informational addresses given above.

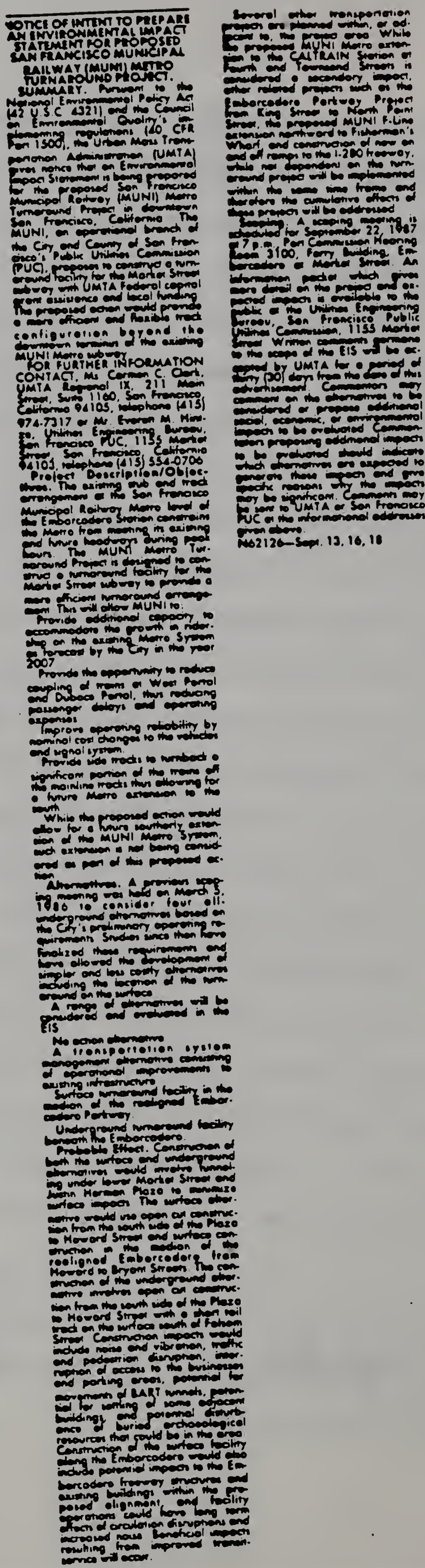
Henry Nejako

Henry Nejako
Deputy Regional Administrator

Issued on: SEP 8 1987

San Francisco Progress

September 13, 16, 18, 1987



NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED SAN FRANCISCO MUNICIPAL RAILWAY (MUNI) METRO TURNAROUND PROJECT.

SUMMARY. Pursuant to the National Environmental Policy Act (42 U.S.C 4321) and the Council on Environmental Quality's implementing regulations (40 CFR Part 1500), the Urban Mass Transportation Administration (UMTA) gives notice that an Environmental Impact Statement is being prepared for the proposed San Francisco Municipal Railway (MUNI) Metro Turnaround Project in downtown San Francisco, California. The MUNI, an operational branch of the City and County of San Francisco's Public Utilities Commission (PUC), proposes to construct a turnaround facility for the Market Street subway with UMTA Federal capital grant assistance and local funding. The proposed action would provide a more efficient and flexible track configuration beyond the downtown terminus of the existing MUNI Metro subway.

FOR FURTHER INFORMATION CONTACT, Ms Carmen C. Clark, UMTA Regional IX, 211 Main Street, Suite 1160, San Francisco, California 94105, telephone (415) 974-7317 or Mr. Everett M. Hintze, Utilities Engineering Bureau, San Francisco PUC, 1155 Market Street, San Francisco, California 94103, telephone (415) 554-0706

Project Description/Objectives. The existing stub end track arrangement at the San Francisco Municipal Railway Metro level of the Embarcadero Station constrains the Metro from meeting its existing and future headways during peak hours. The MUNI Metro Turnaround Project is designed to construct a turnaround facility for the Market Street subway to provide a more efficient turnaround arrangement. This will allow MUNI to:

Provide additional capacity to accommodate the growth in ridership on the existing Metro System as forecast by the City in the year 2007

Provide the opportunity to reduce coupling of trains at West Portal and Duboce Portal, thus reducing passenger delays and operating expenses

Improve operating reliability by nominal cost changes to the vehicles and signal system.

Provide side tracks to turnback a significant portion of the trains off the mainline tracks thus allowing for a future Metro extension to the south

While the proposed action would allow for a future southerly extension of the MUNI Metro System, such extension is not being considered as part of this proposed action.

Alternatives. A previous scoping meeting was held on March 5, 1986 to consider four all-underground alternatives based on the City's preliminary operating requirements. Studies since then have finalized these requirements and have allowed the development of simpler and less costly alternatives including the location of the turnaround on the surface.

A range of alternatives will be considered and evaluated in the EIS

No action alternative

A transportation system management alternative consisting of operational improvements to existing infrastructure

Surface turnaround facility in the median of the realigned Embarcadero Parkway.

Underground turnaround facility beneath the Embarcadero.

Probable Effect. Construction of both the surface and underground alternatives would involve tunneling under lower Market Street and Justin Herman Plaza to minimize surface impacts. The surface alternative would use open cut construction from the south side of the Plaza to Howard Street and surface construction in the median of the realigned Embarcadero from Howard to Bryant Streets. The construction of the underground alternative involves open cut construction from the south side of the Plaza to Howard Street with a short tail track on the surface south of Folsom Street. Construction impacts would include noise and vibration, traffic and pedestrian disruption, interruption of access to the businesses and parking areas, potential for movements of BART tunnels, potential for settling of some adjacent buildings, and potential disturbance of buried archaeological resources that could be in the area. Construction of the surface facility along the Embarcadero would also include potential impacts to the Embarcadero freeway structures and existing buildings within the proposed alignment, and facility operations could have long term effects of circulation disruptions and increased noise. Beneficial impacts resulting from improved transit service will occur.

Several other transportation projects are planned within, or adjacent to, the project area. While the proposed MUNI Metro extension to the CALTRAIN Station at Fourth and Townsend Streets is considered a secondary impact, other related projects such as the Embarcadero Parkway Project from King Street to North Point Street, the proposed MUNI F-Line extension northward to Fisherman's Wharf, and construction of new on and off ramps to the I-280 freeway, while not dependent on the turnaround project will be implemented within the same time frame and therefore the cumulative effects of these projects will be addressed.

Scoping. A scoping meeting is scheduled for September 22, 1987 at 7 p.m., Port Commission Hearing Room 3100, Ferry Building, Embarcadero at Market Street. An information packet which gives more detail on the project and expected impacts is available to the public at the Utilities Engineering Bureau, San Francisco Public Utilities Commission, 1155 Market Street. Written comments pertaining to the scope of the EIS will be accepted by UMTA for a period of thirty (30) days from the date of this advertisement. Commentors may comment on the alternatives to be considered or propose additional social, economic, or environmental impacts to be evaluated. Commentors proposing additional impacts to be evaluated should indicate which alternatives are expected to generate these impacts and give specific reasons why the impacts may be significant. Comments may be sent to UMTA or San Francisco PUC at the informational addresses given above.

N62126—Sept. 13, 16, 18

WRITTEN EIS SCOPING COMMENTS

APPENDIX II

City and County of San Francisco
Department of City Planning

450 McAllister Street
San Francisco, CA 94102

DMINISTRATION
15) 558-6414 / 558-6411
ITY PLANNING COMMISSION
15) 558-6414
LANS AND PROGRAMS
15) 558-6264
MPLEMENTATION / ZONING
15) 558-6377

RECEIVED
10/22/87 - 2:15 pm
Utilities Engineering Bureau

October 8, 1987

MEMORANDUM

To: Mr. Everett M. Hintze, Utilities Engineering Bureau (PUC)
From: Jim McCormick, Office of Environmental Review
Re: MUNI Metro Turnaround EIS Scope of Work

In addition to the issues which were identified in the information packet of September 4, 1987 to be included in the EIS, the document should address the potential for encountering hazardous materials in the soil during project construction. As you may be aware, San Francisco has passed an ordinance which requires mandatory soils testing for proposed projects on land-fill east of the high tide line, due to the potential for hazardous materials to be present in these locations. It appears that this project would be subject to that requirement. It is clear, therefore, that the issue is of some concern in the project area and should be examined as part of the EIS.

If you have any questions, please call me at 558-6394.

cc: Earth Metrics ✓

JMC/112

City and County of San Francisco **Recreation and Park Department**

October 19, 1987

RECEIVED
10/22/87 - 8:20 am
Utilities Engineering Bureau

Mr. Everett M. Hintze
Project Manager
Utilities Engineering Bureau
San Francisco Public Utilities Commission
1155 Market Street
San Francisco, CA 94103

Re: Muni Metro Turnaround EIS

Dear Mr. Hintze.

The Recreation and Park Department has received the information packet describing the following alternatives to be analyzed in the EIS:

- No action alternative.
- A transportation system management alternative consisting of operational improvements to existing infrastructure.
- Surface turnaround facility in the median of the realigned Embarcadero Parkway.
- Underground turnaround facility beneath the Embarcadero.

The Recreation and Park Commission has jurisdiction of Justin Herman Plaza and a portion of Ferry Plaza, therefore, impacts of proposed alternatives on adjacent parkland are a matter if particular concern. A thorough discussion of impacts and mitigations should be provided to fulfill the federal EIS requirements related to use of public parkland. The following issues should be examined in discussing proposed turnaround alternatives.

1. Disruption to recreational use of parkland during construction, including the duration if impacts.
2. Activities impacting public access to parkland.
3. Noise, odor or visual impacts of construction and operation of each alternative related to parkland.
4. Potential for subsidence of parkland.
5. Plans for redesign, restoration and reconstruction of parkland disturbed by construction (Alternatives 3 and 4).

McLaren Lodge, Golden Gate Park

San Francisco 94117

We appreciate the opportunity to submit our concerns regarding potential impacts of the proposed project. Please continue to keep this department informed as design development and environmental review continues. Deborah Learner, Park Planner, should be contacted for additional input during the environmental analysis.

Sincerely,

Mary E Burns

MARY E. BURNS
General Manager

MEB/DL/vr

cc: Deborah Learner

0239d

3. EIS SCOPING COMMENTS EVALUATION

This section responds to public comments gathered during the EIS scoping process in two ways. First, each comment is evaluated to determine whether the concern is relevant for examination in the EIS document. Second, for these concerns found relevant, a brief description of the potential project-related impacts, their analysis and anticipated mitigation measures is provided.

The EIS will respond to those relevant concerns raised during the first and second Muni Metro Turnaround scoping processes. However, because the project scope and alternatives have been changed since the original scoping meeting occurred, issues addressed in the first scoping report may no longer be appropriate for incorporation into the EIS document.

The numbers appearing on the left hand margin below correspond to issues identified in Section 1.

Comment Number

1, 2, 4, 5. These comments refer to the impact of construction on access to existing parklands and Bayfront amenities in the project area. Specific concerns for Justin Herman Plaza and the Esplanade south of the Ferry Building has been identified. The EIS will describe the potential impacts resulting from construction and system operation to all parkland and Bayfront public places within the project area. The State of California and Federal regulations require that all direct and indirect impacts to parklands and historical sites be identified and reviewed by their respective State and Federal commission. The review process according to Section 106 and 4(f) guidelines will be adhered to as part of the EIS evaluation of Justin Herman Park, the Bayfront Esplanade, and the historic buildings fronting the Embarcadero south of Mission Street. Because much of the construction work in this area involves tunneling, mitigation measures that provide continued use of and access to the aforementioned sites will be identified, including noise and dust abatement and ground stabilization measures.

3, 7 As part of the EIS process and conceptual engineering, existing borings in the project area will be reviewed to determine soil and hydrologic conditions, and the potential for soil subsidence. A site history for hazardous waste contamination will be conducted as required by City Ordinance No. 253-86.

If site history reveals any potential hazard, soil sampling and chemical testing will be performed during final design to determine mitigating actions.

6 The EIS will include technical reports for noise, air quality, and visual impacts related to the project alternatives. Impacts resulting from construction or operation of each alternative will be identified and appropriate mitigation measures, such as noise and dust abatement and storage of equipment in one location near the construction site, will be described.

8 Mitigation measures outlined in the EIS will include, if necessary, plans to restore or reconstruct any parklands or Bayfront access altered by project construction. However, tunneling should minimize the amount of restoration required for the parklands or Bayfront already described. Additionally, the EIS will identify all permit requirements necessary to begin construction in the project area, including BCDC Bayfront construction permit.

APPENDIX III. SUMMARY OF APPLICABLE PLANS AND POLICIES OF MUNI METRO TURNAROUND

Urban Mass Transportation Administration	Turnaround qualifies as a rail modernization project, has priority over new or extension projects.
Corps of Engineers	No impact on water quality, navigability, flood protection; no disposal of dredged or fill material in United States waters. Corps permit not required.
California Office of Planning and Research	Priority for public transportation projects that reduce dependence on private auto use.
CALTRANS	
- CALTRANS Director's Policy Statement, 1987	Advocates cost effective and equitable transit services.
- I-280 Transfer Concept Program	All action alternatives provide for Turnaround.
- CalTrain 1987-1992 five year Plan	Supports Turnaround project but does not accept LRV service to CalTrain Depot as adequate for service of high capacity heavy rail. No route conflicts between Turnaround and CalTrain extension to Transby Terminal.
California Transportation Commission (CTC)	The policy making body of the State transportation agency. CTC has jurisdiction over expenditures of State transportation and Federal highway resources; all expenditures are determined through its State Transportation Improvement Program (STIP) process. MTC priorities become input for CTC prioritization.
California State Lands Commission	Exercises a "revisionary interest" in all State tidelands from original grant to San Francisco, and oversight of Port land uses under the Burton Act of 1968 which transfers Port from State to City jurisdiction.
San Francisco Bay Regional Water Quality Control Board	Jurisdiction to control runoff from new construction; the Board usually defers responsibility to local

(CONTINUED)

APPENDIX III (CONTINUED). SUMMARY OF APPLICABLE PLANS AND POLICIES OF MUNI METRO TURNAROUND

	agencies. RWQCB can step in if local agencies do not enforce water quality standards.
Bay Area Air Quality Management District	See Sections 3.6 and 4.6 for discussion of applicable BAAQMD Standards.
Bay Conservation and Development Commission	
- McAteer-Petris Act	Grants BCDC a consistency review function for federally assisted projects. Federally assisted projects reviewed for consistency with the San Francisco Bay Plan and San Francisco Special Area Plan. Grants BCDC jurisdiction over all shoreline within 100 feet of the Bay. Land use, design and public access review.
- San Francisco Bay Plan	Favors water transportation and public transit facility developments, and discourages private automobile use. Encourages maximum pedestrian public access to waterfront areas.
- San Francisco Waterfront Special Area Plan	Expand public open space and access when substantial change from maritime to nonmaritime use. Stresses preservation of buildings with architectural or historical merit.
- Total Design Plan, Piers 7 to 24	Standards of open space, public access and building design for area of waterfront from Broadway to Bay Bridge. Endorses Turnaround and LRV extension.
Metropolitan Transportation Commission	
- New Starts Policy, Regional Transportation Plan, 1988	Endorses priority of transit over private automobile use in San Francisco. Turnaround is approved for capital funding under UMTA Section 3 Transit Capital Program and MTC's New Rail Starts and Extensions Program.
- MTC Transportation Improvement Program 1988-1992	Approved Turnaround funding as part of I-280 Transfer Concept Program; approval continued in 1988-1992 TIP.

(CONTINUED)

- Peninsula Mass Transit Study	Recommends extension of Metro Service to CalTrain Station including Turnaround and CalTrain into Central Business District.
- Seaport Plan	In San Francisco, seaport priority use areas are south of China Basin.
Association of Bay Area Governments, Projections '87	Population and employment expansion in San Francisco area assume that the transportation system will be upgraded and expanded as required to accommodate growth.
San Francisco Department of City Planning	
- Comprehensive Plan Elements	
• Commerce and Industry	Central Waterfront Plan implements industrial and maritime policies of this element in south Port area. Expansion of downtown should not impact on industrial and maritime land uses.
• Energy	Encourage energy efficient transportation alternatives.
• Environmental Protection	Conserve resources; control transportation noise. Develop and use electrical powered urban transit systems; restrict the use of motor vehicles to improve air quality.
• Recreation and Open Space	In the Bay Shoreline Zone, the goal is to expand open space along the Bay while maintaining other essential waterfront uses.
• Transportation	Establishes policy of priority for public transit in San Francisco. Intensify overall transit service in the central City area.
• Urban Design	Establishes urban design guidelines encompassing height, bulk, building form, view corridors and streetscape for design review of major projects.

(CONTINUED)

APPENDIX III (CONTINUED). SUMMARY OF APPLICABLE PLANS AND POLICIES OF MUNI METRO TURNAROUND

* Central Waterfront Plan	China Basin to Islais Creek Bayfront plan. Expansion of downtown should not impact on industrial and maritime land uses. Specifies extension of LRV line through Central Waterfront along Third Street corridor connecting to Embarcadero LRV line.
* Downtown Plan	Improvements to the Municipal Railways Metro service is a key element in the City's capacity to absorb increased growth predicted in the Downtown Plan. Turnaround essential for peak service capacity increases.
* Northeastern Waterfront Plan	Specifies improved public transit service be developed in preference to private vehicle facilities. Establishes guidelines for waterfront access.
- Rincon Hill Plan	Plan specifies enhanced Municipal Railway Service in Rincon Hill area.
- South of Market Plan	South of Market deficient in transit and open space resources.
- South of Market Interim Zoning Controls	Proposals for rezoning South of Market area.
- Mission Bay Transportation Network	Details plans for extension of MUNI Metro from CalTrain depot through Mission Bay.
- Department of Public Works	
* Noise Ordinance	Establishes construction noise standards.
* Procedure for Hazardous Wastes Soils Analysis	Procedures for site history hazardous waste soil contamination procedures.
Office of Community Development and Housing Assistance Plan	Details project area grants for 1987 and 1988. Housing unit assistance and Embarcadero YMCA are recipients of HUD funds.

(CONTINUED)

APPENDIX III (CONTINUED). SUMMARY OF APPLICABLE PLANS AND POLICIES OF MUNI METRO TURNAROUND

Municipal Railway	
- Capital Improvement Program	Turnaround No. 1 priority for MUNI.
- Municipal Railway Short Range Transit Plan	Turnaround 1987-1992 No. 1 transit capital priority.
Real Estate Department/Central Relocation Services	Relocation benefits for displaced individuals or businesses in Turnaround project area.
Redevelopment Agency Rincon Point-South Beach Redevelopment Plan	Outlines redevelopment plans for Turnarounnd area. Encourages MUNI Metro rail service into the redevelopment area.
Port of San Francisco Maritime Strategy II 1979, and Resolution 87-96	Identifies land under Port jurisdiction in Turnaround area as urban waterfront commercial, recreational and open space. Resolution 87-96 specifies evaluation requirements for projects on Port Lands that have potential impacts on Port property, Port lands, operations or revenues.
American Institute of Architects, The Embarcadero Plan	Proposes unified approaches to waterfront planning. Specifies landscaped transit spine for the Embarcadero.

APPENDIX III. MUNI METRO TURNAROUND REQUIRED PERMITS AND APPROVALS

Federal	
- Urban Mass Transportation Administration	NEPA Environmental clearance, financial assistance for final design and construction.
California State	
- Lands Commission	Approval for use of Port of San Francisco lands. Evaluation of public trust requirements of State Constitution and 1968 Burton Act.
- Office of Historic Preservation	State Coordinator for National Historic Preservation Process (Section 106).
Regional	
- Bay Conservation and Development Commission	Turnaround involves land use changes within 100 feet of the water's edge. BCDC reviews for land use, public access and architectural design.
- Metropolitan Transportation Commission	Regional approval for State and matching local funds for Federal transportation and transit funds expenditure.
City and County of San Francisco	
- Board of Supervisors	Authorize and approve funding.
- Public Utilities Commission/ Municipal Railway	Implementing agency.
- Planning Commission, Department of City Planning	Review for compatibility with Comprehensive Plan and area plans.
- Department of Public Works and Department of Health	Approval of Hazardous Waste Soil Report; DPW approval of Embarcadero roadway and other City street modifications.
- Port of San Francisco	Certify that the Port's public trust role and the viability of rail service in the waterfront area are not jeopardized. Request abandonment of Belt Line Right-of-Way in project construction area is required. Design

(CONTINUED)

	review and approval at schematic, working design and final review/ contract documents stages. Evaluation of impacts on Port operations; impacts on Port land takings and revenues; and impacts on land uses, supply of parking and maintenance.
- Redevelopment Agency	Review for conformance with official redevelopment plan for lands within Rincon Point-South Beach Redevelopment Area.
- Arts Commission	Civic design review of all structures.